AMERICAN GAS JOURNAL

JUNE 1941

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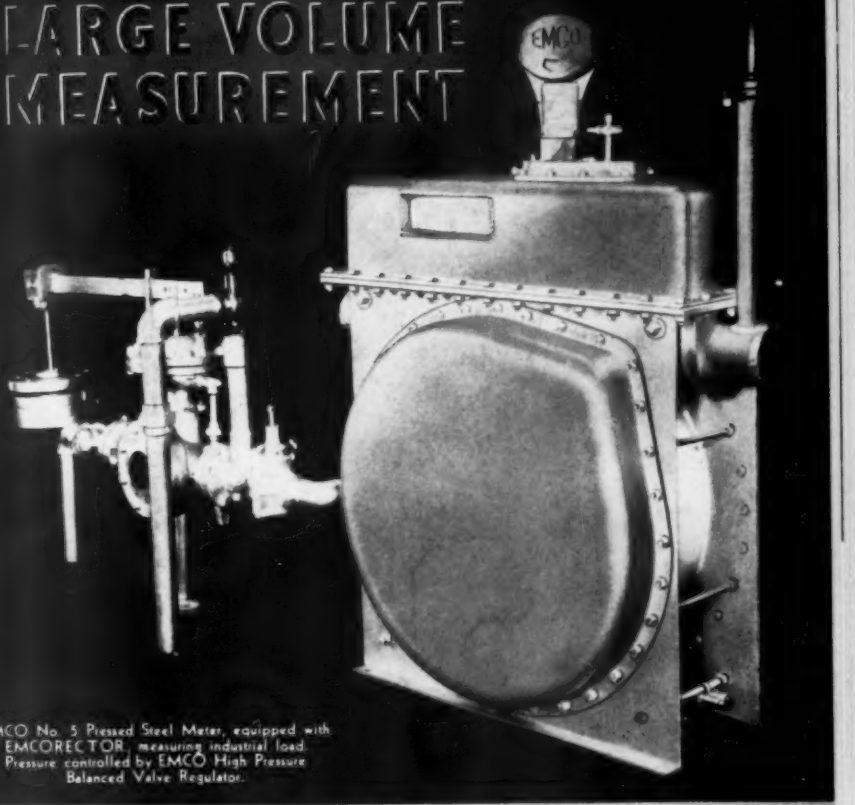
INSIDE INFORMATION *about*
EMCO
PRESSED STEEL
METERS

- Diaphragm easily removed by loosening clamping band screw, and removing clamping band.
- Drain pipes are provided which drain all four diaphragm chambers at their lowest point.
- Rocker shaft and diaphragm bearings made accessible by removing diaphragm pan from rock shafts.
- Top cover easily removed, exposing tangent, tangent arm, and adjustments.
- Strong heavy flag rod, capable of taking all driving strains without deflection.
- Flag and flag rod sturdily built to withstand stresses due to large diaphragm area.
- Tested at double the working pressure for safety.
- Light, strong, pressed steel case reinforced and stiffened by cast iron valve plate.
- Moving parts carried in rigid valve plate, assuring proper alignment under heaviest pressures.
- Extremely compact case, requiring very small floor space.
- Construction reduces leakage risks.
- Positively accurate, whether measuring the flow to a pilot light or up to full capacity.
- No complicated calculations or empirical corrections, thus preventing consumers' dissatisfaction.

OUTSTANDING
for
LARGE VOLUME
MEASUREMENT



EMCO No. 5 Pressed Steel Meter, equipped with EMCORECTOR, measuring industrial load. Pressure controlled by EMCO High Pressure Balanced Valve Regulator.

PITTSBURGH EQUITABLE METER COMPANY
NEW YORK CHICAGO DES MOINES KANSAS CITY
TULSA BUFFALO MEMPHIS
MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.
NATIONAL METER DIVISION, Brooklyn, N. Y.
SAN FRANCISCO PHILADELPHIA LOS ANGELES
BOSTON OAKLAND HOUSTON COLUMBIA

EMCO PRESSED STEEL METERS

Fool-proof and leak-proof

To lay mechanical joint cast iron pipe does not require trained men whose skill may be needed for National Defense. The mechanical joints made by CIPRA members are both fool-proof and leak-proof. They can be installed easily and quickly by inexperienced men. Based on a simple and time-tested principle, these joints are bottle-tight under all working pressures.

[redacted]

[redacted] CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1013 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS.

CAST IRON PIPE

THE STANDARD MATERIAL FOR UNDERGROUND MAINS

Installing any of the joints made by our members is a fool-proof, time-saving operation assuring a bottle-tight joint under high pressures.

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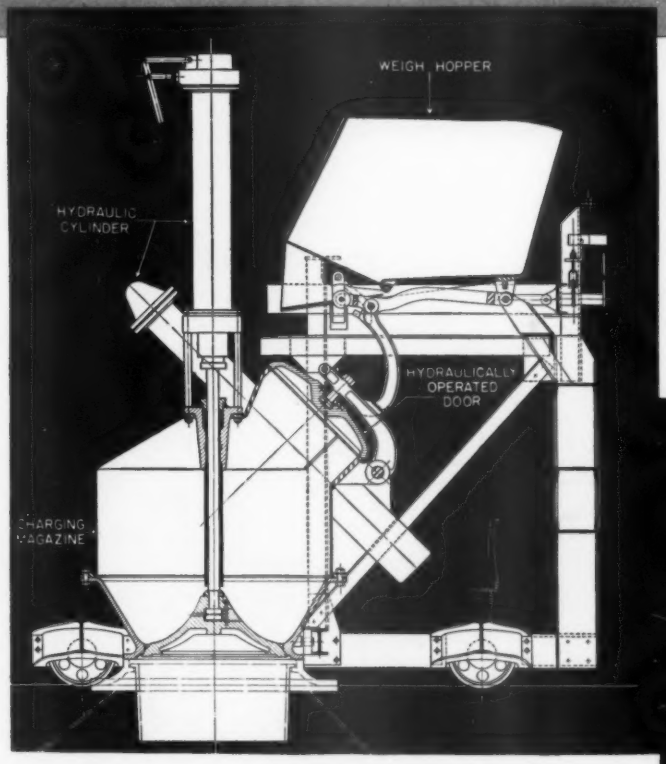
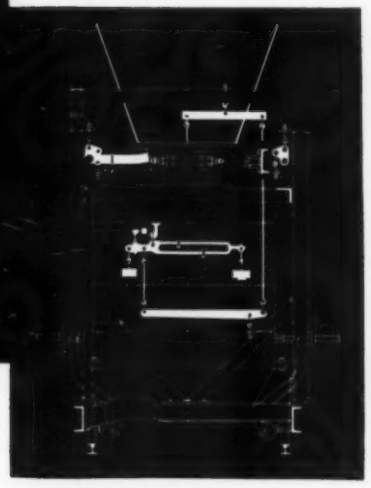
SEMET-SOLVAY *Automatic* CHARGING MACHINE



INCREASES CAPACITY *Saves Labor*



At least ten per cent increase in capacity of your water gas machine can be obtained by the addition of a Semet-Solvay Automatic Charging Machine. Part of the increase is obtained by eliminating shut-downs for charging, part from the added efficiency of a fuel bed of constant depth.

The charger refuels the generator once every cycle during the back-run period. Fuel is accurately weighed by a built-in scale and is uniformly distributed by a hydraulically-controlled spreader. A clamping device gives a gas-tight closure between charger and generator. Seating of the doors is cushioned by the hydraulic cylinders.

The Semet-Solvay Automatic Charging Machine is built for use with any make of water gas or blue gas machine. Automatic charging is not recommended however when the fuel used is bituminous coal. If you operate on coke or anthracite coal, why not write us for further information and a list of satisfied users.

SEMET-SOLVAY ENGINEERING CORPORATION

40 Rector Street — **New York, N. Y.**

AMERICAN GAS JOURNAL, June, 1941. Vol. 154, No. 6. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post-office at East Stroudsburg, Pa., under the Act of March 3, 1879. Printed in U. S. A.

The welcome caller

who doesn't come . . .

You may not find folks waiting at windows . . . but more people than ever before in your community are ready to listen to your story if it's about Gas Refrigeration. They've read tons of advertising why Servel Electrolux can give them advantages they can get in no other make. They'd like to have your salesmen tell them more about it.

Local surveys you yourself can make will corroborate what nationwide studies have shown: more and more people in both the replacement and new user markets are choosing the Gas Refrigerator because they recognize that the reasons why it's different—are also the reasons why it's better.

Retelling Fundamental Story Gets Results

Servel's advertising policy of sticking to the story of basic differences for the last fourteen years has been a helpful factor in this growing trend . . . a trend that represents a tremendous opportunity for everyone who sells Gas Refrigeration.

To help your Gas Company take fullest possible advantage of this opportunity in 1941, this year's advertising is continuing the proven story in fresh dress: "Servel Stays Silent . . . Lasts Longer—because it Freezes with No Moving Parts."

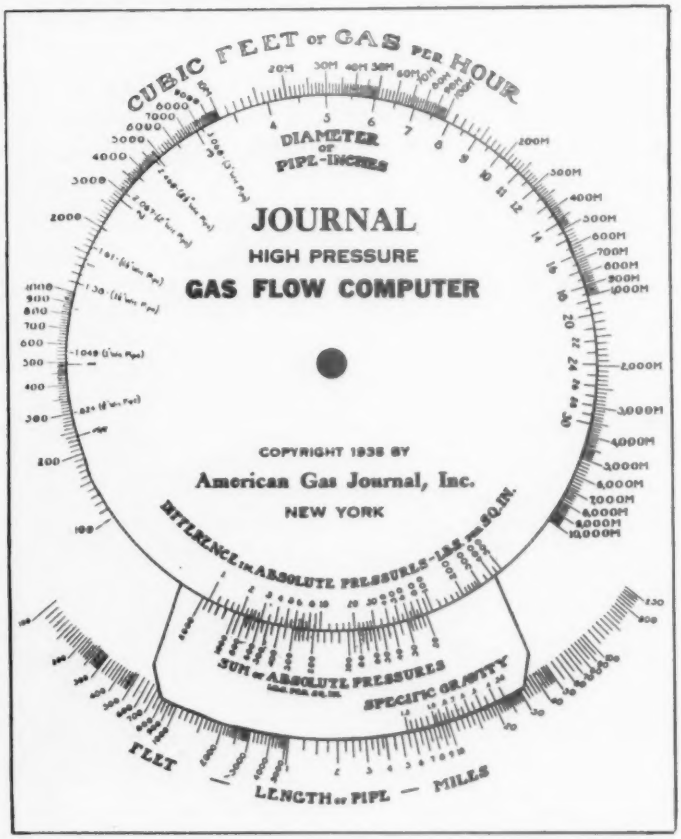
Parallel Local Effort Helps Gas Companies

You have everything to gain from tying up with this theme as extensively as possible in your local newspaper, outdoor, radio and direct mail advertising. For by making sure every member of your community gets this message, you'll be bound to sell more Gas Refrigerators.

In addition to your direct merchandising profits . . . you'll protect your present gas load, build new load without increasing your investment, stimulate the sale of other gas appliances, publicize the modernity of gas and promote "Gas for All Four Jobs."

Wins good will for gas and gas service

"Journal" Gas Flow Computers



New Improved Gas Flow Computers now available of durable celluloid, encased in a convenient leatherette cover with complete instructions.

Actual Size 6¼ x 7½

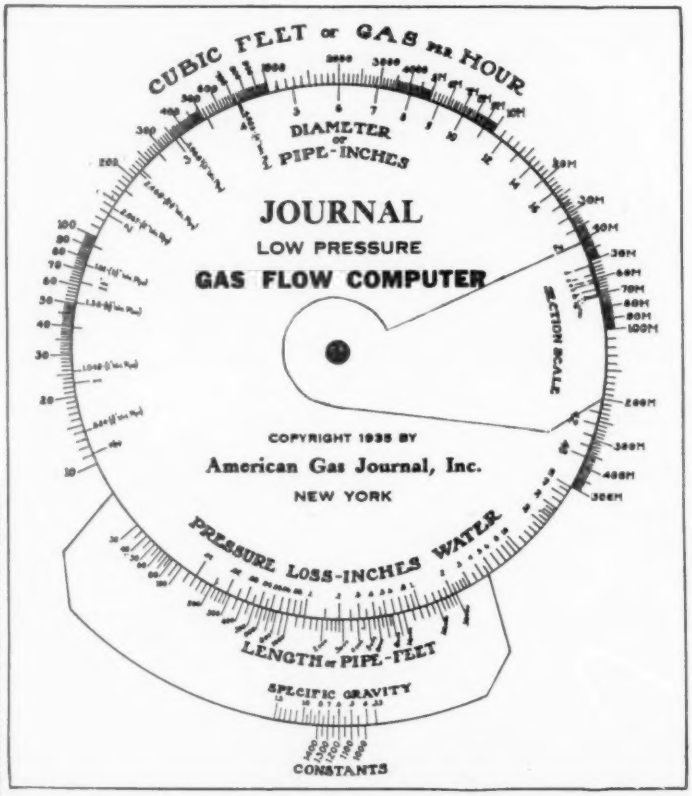
High Pressure Computer Range:

Cu. Ft. of Gas Per Hour—100-10,000 M
Diameter of Pipe Inches ¾-30
Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

Price $3.50 Each, Postage Prepaid



AMERICAN GAS JOURNAL
53 Park Place, New York

Please enter our order for Computers as follows at $3.50 each, postage prepaid

....HIGH Pressure Computer

....LOW Pressure Computer

NAME .....

ADDRESS .....

FOR THE MODERN PLANT

UGI WATER GAS APPARATUS

UGI HEAVY OIL PROCESS

UGI AUTOMATIC CONTROL

UGI WASTE HEAT BOILER

UGI Equipment

UNITED SERVICES PROVIDE

EXPERIENCE IN DESIGN
United has over 50 years experience in gas plant design.

EFFICIENT APPARATUS
United has pioneered major developments in water and coal gas production.

ECONOMICAL CONSTRUCTION
United has large well organized forces for gas plant and general construction work.

EXPERIENCE IN OPERATION
United has experienced plant operators for securing most efficient results.

UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK PHILADELPHIA CHICAGO

"UNIVERSAL"

The Mark of a Satisfied Customer

A Universal Gas Range Installed in the Home of a Domestic Gas Customer is a Guarantee of Customer Satisfaction.

● Consumer good-will is the most valued asset of every Gas Utility. It guarantees a continually increasing number of uses for gas and offers the best protection that any Gas Utility can have against the possibility of costly inroads by a competitive fuel.

The burden of establishing and maintaining this good-will belongs in part to we manufacturers, because it is through the performance of our products that consumers judge the superiority of your fuel.

Cribben and Sexton Company are fully aware of this responsibility, and the modern Universal Gas Range bespeaks careful thought and careful planning in this direction.

Thus, Universal for 1941 offers an automatic "controlled" cooking performance which not only guarantees consumer good-will, but also assures a better appreciation of the true merits of gas—the ideal cooking fuel. In Broiling, Oven and Top-Burner Cooking, Universal offers the utmost in a carefree cooking service . . . Balanced for sales and balanced for profit, the 1941 Universal line offers a cooking service well within the reach of every budget — a service which will merit continued customer good-will.

Cribben and Sexton Company
700 NORTH SACRAMENTO BOULEVARD
CHICAGO ☆ ☆ ☆ ILLINOIS

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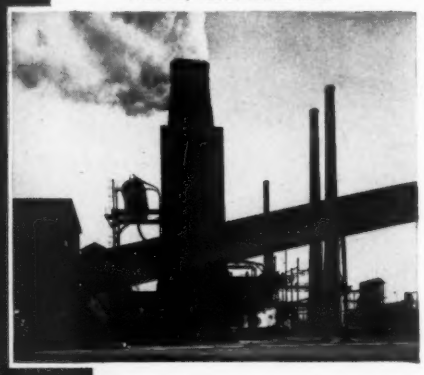
Photos by Robert Yarnall Richie



For everyone in forty-one it's

I serve . . .

It serves the community, without fanfare, in times of tranquillity and times of stress. The **AMERICAN** Tinned Steelcase Meter has been quietly doing its increasingly effective job since 1859—when first appeared the Glover two-diaphragm slide-valve dry gas meter. ◊ Millions of **AMERICAN** Tinned Steelcase Meters are today busy at their appointed tasks . . . each a symbol of protection to gas company and consumer equally. No other instrument has done more to further the cause of reliable gas measurement. ◊ **REVISED CATALOG TG-4** indicates the latest technological advances in design and new skills in manufacture which have brought increased meter capacity, improved performance and accuracy . . . affording lower cost per meter-dollar invested, and sound consumer relations.

GENERAL OFFICES • 60 EAST 42ND STREET, NEW YORK, N. Y.

AMERICAN
METER COMPANY
INCORPORATED (ESTABLISHED 1836)

1655

TINNED STEELCASE METERS

JUNE
1941

AMERICAN GAS JOURNAL

VOLUME 154
No. 6

Convention of Natural Gas Section American Gas Association

Dallas, Texas May 5-7

Executive and Managing Committee dinner and meeting at Natural Gas Section Convention, left to right: E. F. Schmidt; A. F. Bridge; H. C. Cooper; R. E. Wertz; W. C. Beckjord; E. H. Poe; H. D. Hancock; F. French Robinson; B. R. Bay; T. J. Strickler; T. B. Gregory; Alexander Forward.

WITH AN ATTENDANCE of delegates numbering approximately 1050, the thirty-sixth annual Natural Gas Convention gathered at Dallas Texas for three days commencing May 5th.

General Sessions, Transmission and Production Conferences, Industrial and Commercial Sales as well as Accident Prevention and Accounting Conferences were held at the Adolphus Hotel while Residential Gas Sales Conferences carried on at the Baker Hotel.

An outstanding theme in various meetings was that of National Defense and the part that natural gas is called upon to play in its accomplishment.

When opening the General Session on Monday, which was presided over by H. D. Hancock, President of Gas Advisers Inc., New York and Chairman of the Natural Gas Section of A.G.A., D. A. Hulcy, President of Lone Star Gas Company of Dallas offered his address of welcome to the delegates on behalf of the Republic Natural Gas Company of Houston, Southern Union Gas Co. and Lone Star Gas Co., of Dallas.

Mr. Hulcy stated that the natural gas industry had its full quota of problems, that its various trials, tribulations and emergencies had been met, and that the companies will continue to "carry on business as usual plus complete cooperation in the national defense program."

Mr. Hancock in his address expressed the sentiment that the industry raises no objection to equitable government regulation in the public interest, but deplored the exercise of regulatory powers which are unreasonable and which are unjust and injurious to the industry and eventually to the public it serves.

Thomas J. Strickler, President A.G.A. called for improved public relations through local institutional advertising based on the industry's contributions to the National Defense.

Public opinion, he felt, is a power that will always retain its strength and cannot be destroyed in spite of the influence of dictators to effect temporary modifications.

John Temple Graves II, editor of the *Birmingham Age Herald* followed with a forceful address on behalf of National Defense. "We may be persuaded," he said, "not only to defend our American system but to identify it. It is the system which has made us great, and we may be the only country in the world using it after the war."

The second general session was presided over by J. French Robinson, vice-chairman of the Natural Gas Section and President of the East Ohio Gas Co. of Cleveland.

Alexander Forward, Managing Director of the A.G.A. chose "Fuel Comments" for his subject. He felt that the industry should be prepared to accept still greater regulation for greater conservation to offset the scarcity of fuels going to other nations under the national emergency.

W. E. Derwent, vice president of George D. Roper Corpn., and President of A.G.A.E.M. spoke on the objects of his Association, one of which is to secure and maintain the good will of the public in the matter of gas appliances and their performance.

The sales of appliances for 1941 in the five divisions of this group he believed would reach a total of at least 180 millions of dollars unless operations are curtailed.

In 1940 gas range manufacturers sold 1,750,000 ranges nearly 25% of which were for use with liquefied petroleum gas. Promotion and advertising expenditures for this year will be $4,200,000 as against $3,700,000 in 1940.

"Health and Safety in the Gas Industry" was the subject of a paper by Dr. R. R. Sayers of the U. S. Bureau of Mines which was read by R. A. Cattell of the Bureau.

The senior class of the Texas College of Arts and Sciences of Kingsville was presented and students individually introduced at this session.

Guests were reminded of CP on every hand, from the "yippees" that echoed from a 15 foot branding corral in the lobby of the Hotel Adolphus to the harmonious strains of the roving CP Ranger Band. At the corral, convention guests received genuine Texas cowhide convention souvenirs, branded with the CP seal before their very eyes by old-time cowboys.

Beautiful lariat-looping CP cowgirls enhanced the corral. Full-size top grain Texas steerhides, suspended across the lobbies of the Adolphus and Baker Hotels, bore the message, "Natural Gas Convention, Dallas, 1941—For Everyone in '41 It's CP." These steerhides were bathed in ever-changing varicolored lights.

The CP Ranger Band made a hit with their bagful of popular songs and tunes from the Texas prairies. Painted on the backs of their colorful shirts were such timely slogans as: "You've got something to sing about, too. It's CP," and, "You can't go wrong singing this song—For Everyone in '41, It's CP."

HERE AND THERE DURING THE CONVENTION

Photos on Facing Page

Top row, l. to r.: D. A. Hulcy, Pres., Lone Star Gas Co.; E. F. Schmidt, V. P. J. L. Foster, General Supt., Lone Star Gas Co.; H. P. Boncher, Dresser Mfg. Co.; H. D. Hancock, Pres., Gas Advisers, Inc., New York. (1) Oliver S. Hagerman, New York; Mr. and Mrs. H. D. Straight, Grand Rapids, Mich. (2) Maurice White, Mobile, Ala.; Paul R. Taylor, New York; Peter J. Brown, Mobile; H. T. Strange, Mobile. (3) E. Holley Poe, New York; J. French Robinson, Cleveland, Ohio. (4) Paul R. Taylor, Stone & Webster, New York; J. French Robinson, Cleveland; and L. L. Dyer, Dallas. (5) E. R. Myhre, Kansas City; R. M. Scoggins, Shreveport, La.; T. M. McKenzie, Shreveport, La. (6) E. F. Schmidt, Dallas; T. B. Gregory, Pittsburgh; R. G. Soper, Dallas: C. W. Sears, Pasadena, Calif.

TRANSMISSION CONFERENCE SESSIONS

These three sessions were presided over by Julian L. Foster, chairman of the Transmission Committee of the Natural Gas Section and general superintendent of the Lone Star Gas Company. First on the program was "Method of Maintaining High Pipe Line Flow Efficiency," by J. William Ferguson. He discussed internal cleaning, dust cleaning, dehydration and increased capacity. In conclusion he stated that the "Problem as to whether the line should be kept clean, or cleaned periodically, is essentially one of economics . . . in general, the wisest and cheapest course is to keep the lines clean from their inception."

Weather forecasting and its relation to gas dispatching was presented by E. M. Laulhere, Technical Supervisor, Southern California Gas Company, Los Angeles. He stated that "It would be of invaluable help to the dispatcher to receive hourly reports from strategic locations covering his entire system. These reports should include atmospheric temperature, wind direction and velocity, rain fall and humidity data."

P. McDonald Biddison, consulting engineer of Dallas presented a contribution on "Pipe Line Flow Calculations." This paper was discussed by R. A. Ransom, engineer, Panhandle Eastern Pipe Line Company, New York.

"Modern Compressor Station Design Suction and Discharge Piping," was presented in a paper by C. S. Kenworthy, Natural Gas Pipe Line Company of America, Chicago. There followed a panel discussion covering "Jacket Water Cooling and Treating," by O. H. Moore, Lone Star Gas Company; "Mufflers," by H. P. George, Southern California Gas Company; "Gas Cleaners," by T. H. Kerr, The Ohio Fuel Gas Company, Columbus; "Lubrication," by B. L. Rogers, Lone Star Gas Company, Texas and "Electric System to Prevent Electrolysis," by Paul F. Marx, Northern Natural Gas Company, Omaha.

At the branding corral; Left to right: E. Holly Poe, secretary, Natural Gas Section, a Texas cowpuncher wielding a CP branding iron; and John E. Bogan, sales promotion director, Domestic Gas Range Division, A.G.A.E.M.

"Our Experience with 24" Solid Welded Pipe Lines," by J. T. Innis, engineer of the Northern Natural Gas Company was next on the program, followed by "Metalizing," by W. J. Garner, General Shop Foreman, Lone Star Gas Company.

"Progress in Liquefaction and Regasification of Natural Gas Process," by John A. Clark of the Hope Natural Gas Company, was presented at the third conference. This paper is published in full elsewhere in this issue. "Water Content of Compressed Gases," by W. M. Deaton and E. M. Frost, Jr. of the U. S. Bureau of Mines will appear in July issue.

The papers which followed were "Welded Pipe Headers and Their Reinforcement," by Eric R. Seabloom of the Crane Company, Chicago; "Improvements and Use of Pipe Line Construction Equipment," by S. D. Bechtel, W. A. Bechtel Company, San Francisco. Discussion was entered into by Lawrence H. Favrot, LaTex Construction Co., Houston, Charles S. Foreman, Kansas City, and Tom Jones of Dallas.

PRODUCTION CONFERENCE

These two meetings were presided over by E. L. Rawlins, Chairman of the Production Committee of the Natural Gas Section. The program included: "Specific Volumes and Critical Properties of Separator Gas and Liquid Hydrocarbon Mixtures," and a symposium on shooting and acidizing of wells entered into by J. J. Schmidt, field superintendent, The East Ohio Gas Company, Cleveland, and Coleman Hunter, geologist, Kentucky-West Virginia Gas Company. An open discussion followed.

At the second conference the program included the following: "Mixing of Gases in Porous Media," by R. L. Huntington, director, Valentine Mertz, Natural Gas Fellowship Student, School of Chemical Engineering, The University of Oklahoma, Norman; "Deposition of Salt in Producing Formations," by Henry C. Walton, Republic Natural Gas Company, Hugoton, Kans., with discussion by J. W. Horne, U. S. Bureau of Mines, Bartlesville, Okla. and E. A. Brown, Lone Star Gas Company, Dallas.

The subject of "Completion of Gas Wells through Producing Pay to Obtain Data for Reserve Estimates and Other Purposes," by J. G. Dickinson, General Superintendent of production, Texoma Natural Gas Company, Amarillo, Texas., was followed by discussion on the part of R. O. Garrett, Arkansas Natural Gas Co., Shreveport, La., L. T. Potter, Lone Star Gas Company, Dallas, Dr. Eugene A. Stephenson, Head Dept. of Pet. Engineering, University of Kansas, Lawrence.

The final paper by W. E. Huddleston, Cities Service Gas Company, Bartlesville, Okla., on "Cathodic Protection as a Possible Means for Preventing Corrosion of Gas Well Casing," was discussed by Starr Thayer, consulting engineer, Houston, and G. R. Olson, United Gas Pipe Line Co., Shreveport.

INDUSTRIAL AND COMMERCIAL GAS SALES CONFERENCE

These two conferences were presided over by H. Carl Wolf, chairman of the Industrial and Commercial Gas Section of A. G. A. and president of the Atlanta Gas Light Company.

The subjects presented were the following: "What's Happening in the Gas Engine Field?" by Manley H. Clark, chairman, Gas Engine Power Committee, Southern Counties Gas Co. of California, Los Angeles, with discussion by other members of the Committee.

There followed a "Progress Report on A. G. A. Boiler Installation Code," by L. S. Reagan, The Webster Engineering Co., Tulsa.

John K. Knighton, Servel, Inc., Evansville, presented a paper on "Year 'Round Air Conditioning and Commercial Refrigeration — New Equipment That Builds Gas Load and Customer Appreciation."

In summarizing his subject he said: "Our opportunity in the air conditioning field is too rich to take chances with. From Servel's point of view our trade relationship with you is too fine a thing to tamper with. From your point of view, your public relationship, or customer relationship, is far too important for you to jeopardize. These are the reasons why I say we are singularly fortunate in that we do have the ability to control our entrance into this new activity by whatever basis of selectivity and limitation we may elect, and, out of the experience thus obtained, be fully armed and prepared for the big sales opportunity that lies ahead.

"Gas air conditioning is rich in opportunity, and it must be a satisfying thought to realize that in the accomplishment of a selfish interest from a load building standpoint, we are rendering a real public service—we are contributing to a very major extent to the comfort, health and happiness of our customer. We do have something to be excited about, but let us be certain that we get it under control and guided into its proper channels."

This session closed with a paper by A. C. Grant, commercial engineer, Minneapolis-Honeywell Regulator Co., on "What Automatic Controls on Your Installations Mean to Your Customers and to You."

The second session opened with a symposium on business-getting ideas which analyzed "The Value of Miscellaneous Gas Uses in Building a Well Rounded Industrial and Commercial Gas Load."

Following this, W. B. Head, assistant to vice president and general manager, United Gas Corporation, Houston, spoke on "The Part Natural Gas Is Playing in National Defense."

"Natural Gas in the Larger Heating Operations," was discussed under several headings: Ceramics—D. D. Beach, Macon Gas Co., Macon, Ga.; Metal Industries—George M. Parker, Mississippi River Fuel Corp., St. Louis, Mo.; Refineries—Frank S. Kelly, Jr., Arkansas Louisiana Gas Co., Shreveport, La.; Power Plants—George V. Rowland, Cities Service Gas Co., Bartlesville, Okla.; Railroads—D. W. Reeves, Oklahoma Natural Gas Co., Tulsa.

Mr. Wolf presented a stirring wind-up talk to complete the session.

RESIDENTIAL GAS SALES CONFERENCES

F. M. Rosenkrans, chairman of the Residential Gas Sales Committee of the Natural Gas Section, and New Business Manager of the Gas Service Company of Kansas City, presided at these two sessions.

Following his opening remarks, Paul Taylor, vice-president, Stone & Webster Service Corp., New York, drew attention to the importance of the home unit as furnishing the central theme of the sales picture. He pointed out that even during depression periods the home load remains the bulwark of the natural gas industry.

(*Continued on page 46*)

Two Years' Experience With Reversed Flow Machines at Portland, Maine

By
George R. Steere,*

THE period of operation covered by this report is from February 1, 1939 to February 1, 1941. A reversed flow machine was put in operation about five months previous to this time but was only producing a very small proportion of the gas being made until the last week in January, 1939 when the coal gas plant was shut down entirely.

To evaluate the operation of any equipment, it is necessary to know as much as possible about the conditions under which the operation was conducted. For this reason a brief description of the equipment and these conditions at Portland, Maine, is included in this report.

Plant Equipment

Plant equipment consists of the following:

1. 2—10′ x 9′ x 9′ reversed flow carbureted blue gas machines equipped with back run and automatic control and for the use of soft coal or coke and any type of oil.
2. All auxiliaries for supplying oil, air, steam, etc. in duplicate.
3. Automatic fuel handling from cars to overhead bunker.
4. Duplex Separator for decanting the affluent from the wash box separately from the balance of the condensate in the plant.
5. 1— 5,000 gallon de-emulsifier
   2—10,000 gallon low pressure steam heated tanks, condenser, separator and light oil storage for recovery of light oils from the tar.
6. 1—300,000 3-lift relief holder with 16″ connections.
7. Washer cooler fitted with heat exchangers which are cooled with storage holder water.

Photo Grady
George R. Steere

8. 4—old Roots exhausters, two of which will handle the pumping rate.
9. A multiple washer.
10. 3-section outdoor purifier, fitted with reversing valves on each box and for forward or backward rotation.
11. Rotary displacement station meter.
12. 1—500,000 3-lift storage holder; top lift only can be used.
    1—1,500,000 3-lift storage holder on other side of city and equipped with automatic booster and automatic gas heating.
13. Central drip pumping stations at the plant with drip oil going to storage through an oil separator.
14. 1—415 H. P. boiler with full automatic controls and fitted with burners for Bunker C oil.
    2—old 250 H. P. boilers, hand fired, with the usual feed water heaters, pump, etc.

Special Conditions

The Portland installation had the following favorable conditions:

The entire load was carried on one machine at all times, thus allowing a complete check on effect of cycle, steam, air, etc.

Coke and oil are purchased as used, active storage of coke being not over two weeks and of oil not over four days, thus allowing accurate check of inventory at all times.

All tar produced is sold as fast as it is made, allowing an accurate check on this important item each month by holding the tar in the relief holder to the same level. This condition did not exist, however, for the first nine months of the period covered in this report due to the fact that tar emulsion in storage, from previous operation, was being dehydrated and sold until it was cleaned up. The calculated figures used for tar produced during the time other tar was being handled were later found to have been about .3 gallon per M too low.

Being located in that part of the country still maintaining their independence, this plant has enjoyed the full co-operation of the men who run it, which has permitted a rate of pay for each man according to his ability, thereby encouraging initiative.

Some of the handicaps to securing best results were:

Small relief holder connections which caused excessive back pressure on the machine, averaging 45″ to 50″ during an up run.

For the first eight months period it was necessary to run the machine four times in twenty-four hours because of insufficient storage capacity. A booster was installed at that time, making an additional million feet of gas available and permitting a single make period and one shift less during the summer months.

Approximately 13% of gas produced is sent out of the plant at 15 pounds pressure and these compression costs are a part of manufacture costs as reported.

The plant is old and the arrangement of buildings and equipment is such that more labor than otherwise necessary is used.

The principal gas storage is on the opposite side of the city, making a separate holder heating plant necessary.

All the men in the plant were inexperienced in this type of operation and were trained during this period.

Presented at the Technical Section Joint Committee Conference of the Production & Chemical Committees, American Gas Association, Hotel Pennsylvania, New York, May 19, 21, 1941.

**Mr. Steere is now Vice President in charge of production of the Seattle Gas Co., see American Gas Journal, April, 1941.*

Materials Used

Egg size oven coke of about 10% ash.

Bunker C oil with no required specifications.

Operating Troubles

After the first few months of adjusting equipment, cycles, etc. and training personnel, it can be truthfully said that the operations at Portland have been remarkably free from trouble. Confining this discussion to the water gas machines only, the following mechanical difficulties were encountered.

The grate bars were found to be badly warped each time either machine was shut down due to deliberately driving the heats as low as possible. However, no new bars have been used or will have to be used for some time to come.

The I beams supporting the grate bars have had to be replaced in one machine due to being corroded through.

Oil meters were frequently put out of commission due to the sudden shock of shutting off the oil until expansion tanks were put in the oil lines ahead of them. No trouble from this source for the past year.

Due to the high bottom heats, it was found desirable to use, the cast iron clinker door liners and bed plates burned out frequently. This was overcome by making the brick door jambs 2″ lower and 1½″ narrower on each side than the door opening and abandoning the cast iron liners. The bed plate was replaced by the use of hydrocon in the doorway. Since making these changes a year ago, no more trouble was experienced from this source.

Due to the very high back pressure caused by the small relief holder connections, it was found that it was desirable to raise the seal pot to a height of 4′ above the operating floor to prevent it overflowing when the run goes on. Part of this trouble is also due to the very slight pitch of the seal pot drain, in going to the separator which is mostly above ground level.

Another source of worry from this operation during the first year was the excessive amount of sparks and breeze being blasted out through the stack. Some of these sparks fell to the ground still red hot. Several types of screens were tried with some success but they burned out too fast to be practical. Last May a change in the brick design in the bottom of the carburetor was made and since that time very little breeze has been blowing through the stack, as it is now being trapped in the lower end of the carburetor. This change also resulted in far less free carbon in the tar produced, which seemed to indicate that carbon had been carried into the wash box before the change was made.

Continuity of Operation

The first machine was started September 9, 1938 on gas oil for the first four days until the heavy oil lines were completed and heavy oil has been used exclusively since the first gallon was put in. Each machine has been run until it became necessary to shut it down for repairs to generator lining or grate bar supports. Due to the fact that it is only necessary to operate about ten hours per day during the summer months, it has been possible to make minor adjustments during daily shut down periods. The spare machine is never kept under fire, however, as a standby.

Smoke

Since going on full time operation, the only objectionable smoke has been when a spray has gone wrong or oil or steam purge valves have had to be repaired or replaced and then only long enough to indicate the trouble so that it could be fixed. Many visitors from other plants have classed the amount of smoke being produced as not sufficient to cause them trouble, which is, perhaps, a good way of gauging its density.

Tar Quality

The tar being produced at Portland has been consistently heavy, ranging from a specific gravity of 1.2 to 1.5. This is to be expected as the percentage of reforming through the fire during the back run has never been less than 25% and at times as high as 45%. The solids in the tar have been as high as 25% but are held nowadays to about 12%. All tar is dehydrated down to less than 1.5% moisture and the light oils condensed and sold with the tar. The softening point of the tar as determined by the ring and ball test is being held to 34°C.—36°C. as nearly as possible at the request of the tar purchaser.

The large Duplex tar separator in which one half is used for the tar and water from the wash box, and the other for the washer cooler and all other plant affluent, makes it possible to secure an average water content in the tar from the separator of about 30%. This helps a great deal in cutting down the time and cost of dehydrating.

Carbon Deposits

The carbon deposits in the carburetors of these machines amounted to about 6% by weight of the Conradson carbon that had been put in the carburetor with the oil. When oil of a high carbon content was being used, it was, of course, necessary to clean out the carbon more often. However, in using an oil of 15% Conradson carbon, it was only necessary to remove the carbon about every 5,000,000 feet of gas made.

Carbon deposits have been noted in the top of the superheater on the checker brick at times but none was ever removed. Such deposits did not affect efficiency and did not cause smoke. In time this carbon would burn out by itself.

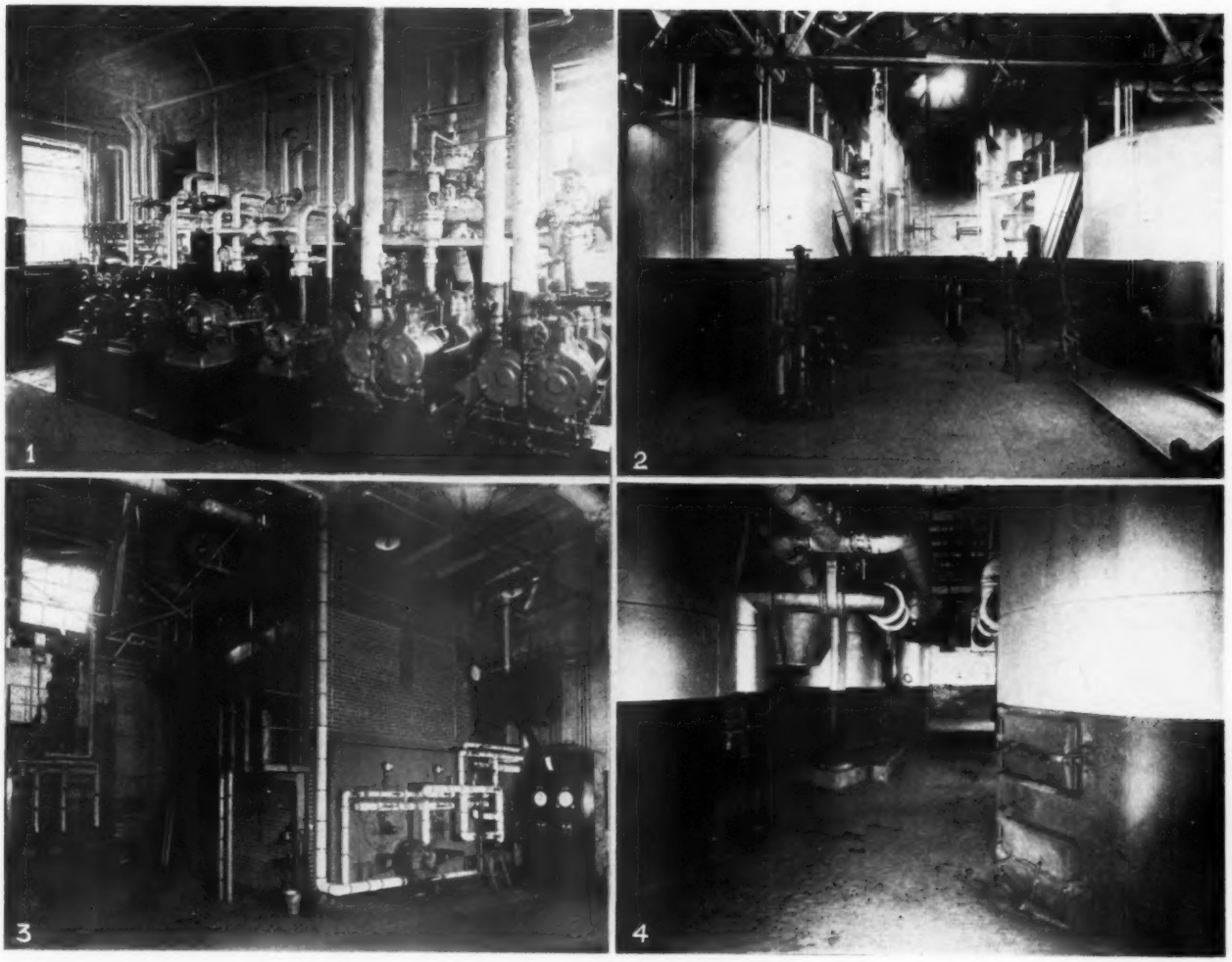
In an effort to eliminate the necessity of removing carbon from the carburetor, changes were made in the arrangement of the brick work and admission of the carburetor air in May 1940 and from the first of June until the middle of December, no carbon was removed from the carburetor of this machine. During this period, approximately 342,000,000 feet of gas were made and the machine carried the entire load of the plant. At times during this period the carburetor built up a great deal of carbon but as the results stayed good and the machine did not smoke, it was kept in operation. It is well to note that, based on a Conradson carbon of 10%, 462 tons of carbon had been put into the carburetor without the necessity of manually removing any. The only reason for shutting it down in December was to be able to do necessary maintenance and inspection.

It is well to note that all oil used for enrichment on these machines has been used in the carburetor during the uprun. Oil on the fire is used only during the back run.

Oil Spray Locations

Each machine is equipped with a water-cooled spray in the top of the carburetor and one in the top of the generator.

As originally installed, a single spud spray was used in the generator and a 5-spud spray with short barrel in the carburetor. Along with the other changes referred to made in the carburetor to eliminate carbon, the spray on that machine was changed to a single spud type and lengthened out until the spray tip



(1) Pump Room; on the right are two 9 x 5 x 10 type V D horizontal duplex steam driven Worthington pumps handling 85 GPM Bunker C Oil at 130°F. against 250 pounds discharge pressure. On the left are the pumps for hydraulic pressure system, for the cooling coils and for washer cooler. (2) Operating Floor View of Semet-Solvay Water Gas Sets. (3) 1415 H. P. Babcock and Wilcox Stirling type boiler with automatic controls for burning heavy oil. (4) Cleaning floor view of Semet-Solvay Water Gas Sets.

was level with the bottom of the offtake to the superheater. This was found to give the best results of any spray tried yet. Both oil sprays use Anthony spray tips.

Thermal Distribution in Set

No temperature studies have been made on the machines in Portland except at the top of the superheater and on the connection between superheater and riser pipe. These two are carried on the recording pyrometer and used to balance the heats.

Several sight cocks are used and these, along with the thermocouples mentioned, clearly indicate that the hottest zone at the beginning of the run is in the lower third of the carburetor, grading down from there to the outlet of the superheater.

With the oils used to date, and setting the heats by trowel tests, it has been found that the control temperature (top of superheater six courses down) would run sometimes as low as 1400°F. and sometimes as high as 1550°F.

No attempt is made to tell the operator exactly what temperature to carry. It is his business to find that out every few minutes as the condition of fire changes and the oil input varies to hold the B.T.U.

It has been found that the character of tar produced changes noticeably with as little as 10 to 20° change in control temperature, and that the rates of gas made and oil input affect it likewise unless heats are changed to hold the tar quality constant.

The secondary air ratio to primary air is regulated to hold the temperature at the outlet of the superheater about 100 to 150° lower than the inlet of the superheater.

Effect on Refractories

The first machine installed was equipped with a first quality fire brick lining in the generator which started to show signs of deterioration in a very few days. As the machine had to be kept going to hold the load while the other was being installed, the lining was repaired from day to day with a Quigley gun during clinkering time. Removable cast iron stools were put in the clinker doorways to support the patchwork and were replaced about every two weeks as became necessary. Due to this trouble a Mullite lining was installed in the second machine to improve conditions if possible. However, it was found to be little better and the same procedure as before was resorted to.

A solid carborundum lining 4' above the grates was then purchased,

having the door jambs 2" lower and 1½" narrower on either side than the original opening. While this was being delivered, a spare clay lining that was in stock was installed in the first machine, replacing original of same material to give an opportunity of installing the carborundum to replace the Mullite. A second carborundum was ordered shortly after the first went into service and put in to replace the second clay lining which was badly damaged in the two weeks it had been in service.

As of March 1, 1941 the first carborundum lining has had 5,143 hours and the other has had 2,787 hours and both are in excellent condition. No more trouble has been experienced with door liners or jambs and the clinker door lute lasts for months instead of days as before.

Checker bricks in the top of the superheater were examined at each shut down and the top two or three courses replaced when necessary.

December 15, 1940, after the first machine installed had had a total of 4,626 operating hours, the checker brick were examined at each checker door level and found to be black nearly all the way through. They were, therefore, removed and new checkers installed, although the results were still satisfactory. The other machine now has 6,990 operating hours on the original checkers and is giving satisfactory results. No examination has been made of the condition of the brick.

The carburetor linings of both machines are glazed and eroded and loaded with carbon and probably should be replaced for best results.

Connections between shells and the riser pipe are in good shape, although some repair work has been necessary at the bottom of the riser pipe where the gas and breeze coke has hit it as it enters from the superheater.

Operating Results and Capacity

A typical cycle used on these machines during the period covered is as follows:

Total time four minutes	
Blast	28%
Blow run	3
Up Run	33
Back run	29
Final up	5
Purge run	2

Rate of oil input to carburetor 50 gallons per minute.

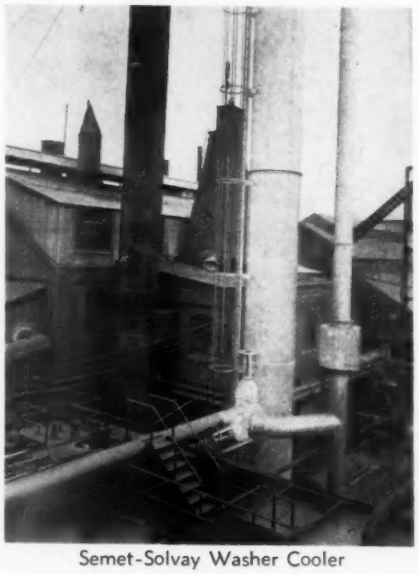
Rate of oil input to generator 30 gallons per minute.

Typical Gas Analysis as sold

CO_2	5.4
Ill	7.6
O_2	0.6
CO	23.9
H_2	39.0
CH_4	13.4
N_2	10.1

Results are given in six months periods to indicate effect of added experience on efficiency and of rising prices on costs. Efficiency figures are based on percent of B.T.U.'s sold to those purchased without including the steam factor and using the constants of

13,000 B.T.U. per pound of coke
150,000 B.T.U. per gallon oil
160,000 B.T.U. per gallon tar



Semet-Solvay Washer Cooler

	Ave. 2/1/39 to 7/31/39	*Ave. 8/1/39 to 1/31/40*	*Ave. 2/1/40 to 7/31/40*	*Ave. 8/1/40 to 2/1/41*	*2 Yr. Ave. 2/1/39 to 2/1/41*
Gas Made	341,569	371,954	349,725	367,112	1,430,360
Fuel/M	14.59	14.36	13.60	14.14	14.17
Oil/M	4.86	4.86	4.81	4.84	4.84
Tar/M	1.165*(1)*	1.350*(3)*	1.293*(3)*	1.580*(4)*	1.347
F.O.T.*(2)*	13.2	13.6	17.5	15.8	15.0
Eff.	78.8	82.1	82.0	85.7	82.1
B.T.U.	538	536	535	535	536
Ave. Hrs./Day	13.89	14.55	13.56	14.10	14.03
Ave. Make/Hr.	137,827	139,372	141,696	142,166	140,265
% Reform	31.3	31.8	33.5	32.6	32.3
F.O.T. on Basis of 1st Period	12.9	11.99	11.80	10.78	11.84

(1) Tar based on calculations
(2) F.O.T. based on prices during these 6 mo. periods
(3) Tar based on amount sold
(4) Extra tar credit during this period because of inventory clean-up

The item labeled F.O.T. is a direct materials cost factor consisting of cost of fuel per M plus cost of oil per M minus value of tar per M. The operation is varied with changing prices to secure the lowest possible F.O.T.

The costs of coke and oil and tar prices changed from time to time during the period covered by this report.

During the first period these were

Coke	$8.50 per ton
Oil	2.5c per gallon
Tar	4.64c per gallon

and have reached a high of

Coke	$9.30 per ton
Oil	3.63c per gallon
Tar	4.37c per gallon

Based on costs of the first period, the average F.O.T. for two years would have been 11.84c per M. The average efficiency for two years is 82.1%. Because of the ample size of the equipment, no attempt was made to secure high hourly capacity. However, from short runs made without reforming, it is evident that no trouble, except from back pressure on holder connections, would be experienced in getting at least 175,000 per hour from each of these machines. When reforming oil up to 40% the best results are obtained at about standard rated capacity of 138,000 per hour. The holder costs have, of course, varied with costs of materials.

...proof that Gas is *better*

In Cornwall, England, in 1792, William Murdock successfully demonstrated that he could light his home with gas and thus obtain an infinitely brighter and more convenient light than man had ever seen before.

...l, Harper-Wyman Co.

Nothing convinces like demonstration

TODAY it is more important than ever for the gas industry to constantly show the public that "Gas does it best". One of the most convincing ways is to demonstrate the Harper Burner System.

Actual demonstration shows modern cooking at peak efficiency... gives full meaning to the Harper principle of "2 burners in 1", each working independently yet both controlled by the same handle. It proves the time-saving speed of the STARTING BURNER . . . shows how the tiny, measured flame of the COOKING BURNER keeps foods at exact boiling temperature with no waste of gas.

Let your customers see the Harper Burner System in action and they immediately appreciate how much time and work the modern gas range saves ...how superior is gas to any other fuel.

HARPER BURNER SYSTEM

DEMONSTRATES THAT "GAS DOES IT BEST"

HARPER
BURNER SYSTEM

TURN THIS PAGE FOR PROOF THAT DEMONSTRATION PAYS...

Demonstrate This Saving To Your Customers

THE MAYTAG SHOP
E. C. MEIERBACHTOL, PROPRIETOR
LE SUEUR, MINN.

February 4th, 1941

Round Oak Company
Dowagiac, Michigan

Dear Sirs:

We use the system of assigning salesmen to customers according to turn, unless the customer asks for one by name. We found that gas range sales did not keep pace with other items sold.

We talked this over with Mr. Lysle Zelner of your company and he pointed out that several men had a much better record of gas range sales in the appliance department. He asked me to watch these men sell and notice that they always demonstrated a range by actually operating the top burners.

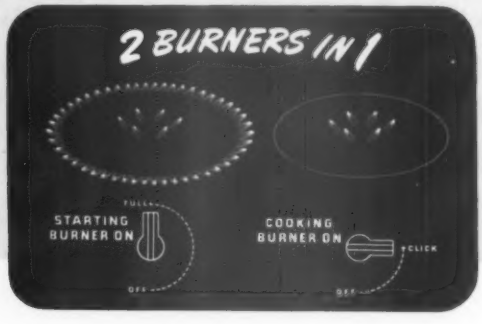
We arranged to have Mr. Zelner give all our men a sales demonstration. The tricks he did with top burners did the trick. Our men now demonstrate gas ranges instead of show them and sales are more than satisfactory.

Very truly yours,

The Maytag Shop
E. C. Meierbachtol

EM

Proof That Demonstration Pays



Chocolate, like butter, is very difficult to melt without scorching it. With most burners, a double-boiler is required.

With the Harper COOKING BURNER, however, you can melt chocolate in a *measuring cup* . . . and you can hold the cup *in your fingers*. Demonstrate this to your customers.

As the chocolate melts, explain how this tiny, controlled burner does away with double-boilers because it has so few ports and can be so accurately adjusted to low heats. Also explain that you are holding the cup in your fingers to demonstrate that the Harper COOKING BURNER wastes no gas up around the sides of a cooking vessel, even a *cup* . . . that it saves up to 39% of fuel!

THIS FREE BOOKLET: "How to Sell More Gas Ranges," contains a series of quick, convincing sales acts planned to dramatize the advantages of the modern gas range. Send for copies for your salesmen. *Harper-Wyman Company, 8562 Vincennes Avenue, Chicago.*

* * *

The Harper Burner System operates on the unique principle of "2 burners in 1". . . a STARTING BURNER *plus a small, economical* COOKING BURNER, *both controlled by the same handle. It is subject to finer gradations of low heats—greater control and economy—than any other cooking unit made.*

HARPER BURNER SYSTEM

—one of the standards of top burner performance under GP

Technical Aspects of Appliance Servicing

By
W. M. Little,

General Superintendent
Gas Distribution—Arkansas Louisiana
Gas Company
Shreveport, Louisiana

TODAY we are faced with modern trends in all phases of industry, and no country in the world is more advanced in this respect than our own. During the past ten or fifteen years, many changes have come about and many new requirements have been placed on us through improvements in designs, demands for increased efficiency and a desire for modern streamlining. Therefore, in order to keep abreast of these developments, the manufacturers and the gas utility industry have been forced to change their views on service methods employed in the days when all a service man needed was a wrench, a screwdriver, and a pair of pliers.

Several years ago the leaders in our industry saw the need of a clearing house for approval of gas equipment and the American Gas Association Testing Laboratory was founded for this purpose. This laboratory, manned by efficiently trained, technical and practical men, acts as a balancing wheel between the manufacturers and dealers in gas appliances, so that our customers may secure more modern, improved service.

Ten years ago we were not confronted with the problems of today. Appliances at that time were manually controlled and could be satisfactorily installed and serviced by the average gas fitter in the utility industry, furniture store, or local plumbing establishment. Such is not the case today. Appliances are manufactured with automatic pilots, automatic thermostats, temperature controls, safety controls, all porcelain and high grade painted exteriors, and electrically controlled devices. What does this mean to the service man? It means a demand for higher utilization efficiency through more constant gas pressure and better flame characteristics.

If we look over the list of appliances approved by the Testing Laboratory and the number of controls being manufactured and placed on these appliances, we find evidence necessitating a change in our Operating and Service Departments. For example, the last list of approved appliances published by the American Gas Association Testing Laboratory shows the following appliances with American Gas Association approval:

Ranges, domestic and commercial	3,236
Water heaters, domestic and commercial	2,571
Central heating appliances	3,071
Other types of heating appliances	2,315
Controls of all descriptions	617

While we realize a great number of these appliances are of the same manufacture, we can get a fair idea of the necessity of trained personnel, if we are to render a service commensurate with the type of appliance sold today.

It seems to us that the utility industry is destined to become responsible for, or at least take the lead in, employing and training men along technical lines for service problems. At present it appears the cost of this type of service crew is prohibitive in the establishments of small dealers and plumbers.

There has been a tendency during the past few years for manufacturers to build appliances with much eye appeal, and to some extent, little serviceability. Some of the new appliances practically have to be disassembled to facilitate minor adjustments. Naturally, the valves, thermostats, burners, etc., cannot be designed into the appliance in convenient places and at the same time give the appliance modern streamlining.

It has become necessary to include in our service crews men who are mechanically, chemically, and electrically minded. If the men we hire today to become modern gas appliance service men were of sufficient intelligence to satisfactorily handle this work with a small amount of training, our problems would be simple. But my experience has been that the average man we employ on our gas appliance service crews has had very little more education than those we employ on less important work. Therefore, we must make up our minds either to employ and pay for technically trained men, or to conduct more training schools in our plants or laboratories. This training must be thorough, and should be constantly maintained from year to year.

Can we as a utility absorb the obligation of appliance servicing, whether or not the appliances have been sold by our company? Since this phase of our work is increasing so rapidly, it is doubtful if the gas industry can justify it from a cost standpoint. If we must assume this work to be necessary for the welfare of our industry, then there should be a charge to the customer for the service so that the "out of pocket" expense can be realized.

In our gas properties we have rendered free service on all gas burning appliances. This service consists only of making gas burning adjustments and is not rendered free when part replacements are necessary. It is true that this service has a tendency to educate a customer on the quality and dependability of the gas company for service, but, on the other hand, its cost will get out of proportion in future years if not watched closely.

With trends toward automatic appliances, the problem of proper installation, particularly venting, has become a major one. With the advent of forced air heating for small residences and the various types of installations made from basement to

Presented at American Gas Association Technical Section, Eighteenth Annual Distribution Conference, Hotel William Penn, Pittsburgh, Pa., April 22, 1941.

attic, much expert, technical information is necessary to provide customer satisfaction through proper installation and service. Heating systems are being installed by contractors primarily interested in air conditioning, and this adds another problem to proper servicing. In dealing with some of these problems which are causing the cost of service to increase possibly out of proportion to revenues, wise management will of necessity look closely into the cost of appliance servicing. Possibly some program should be adopted which would eliminate servicing of appliances not approved by the American Gas Association or some other competent authorities. Strict control of all operating features on appliances will provide the customer with gas burning equipment that will give satisfaction with less service and will help reduce servicing cost.

The following statistics regarding this subject, compiled from records kept over a ten year period, under various operating conditions, give some ideas and facts regarding our changing service conditions and increasing costs:

On a group of approximately 55,000 domestic gas meters located in the Southwest, over a three year period we recorded the following appliances sold by our company:

1938	4,118
1939	4,232
1940	5,000

During the same period the following appliance calls were worked:

1938	14,780
1939	14,000
1940	16,000

During this period, the following service calls were made on appliances not sold by our company:

1938	9,660
1939	9,100
1940	10,280

The percentage of total service calls on company sold appliances, listing only major domestic appliances, for the same period are as follows:

	1938	1939	1940
Ranges	28%	29%	27%
Water heaters	27%	25%	25%
Electrolux	31%	35%	29%
Heating appliances	——	——	13%

The percentage of increase in respect to the overall picture is not shown by the percentages as shown above for 1940, as there was an increase of 2,000 in the total number of service calls as compared to 1939. Practically all this increase was due to new automatic heating appliances.

Going further and comparing some statistics on our operation, for three separate years, at five year intervals, and covering a ten year period, we find the following historical facts:

1930

Thousand cubic feet sold per customer	92.2
Gratuitous service cost per customer	22c
Degree days recorded—12 months	2,624

1935

Thousand cubic feet per customer	81.4
Gratuitous service cost per customer	26c
Degree days recorded —12 months	2,501

1940

Thousand cubic feet sold per customer	88.0
Gratuitous service cost per customer	39c
Degree days recorded—12 months	2,900

The outstanding facts regarding these figures seem to be that with 7,600 more meters in 1940 than ten years previously, and with 276 more degree days added to the heating load of 1940 over 1930, the amount of gas sold per customer decreased from 92 M.C.F. to 88 M.C.F. and the cost of service per customer increased by 17c.

Summarizing again and comparing 1930 with 1940, the following percentages are obtained: Increase in meters—13.8%, increase in heating weather—9.5%, decrease in amount of gas sold to each consumer—4.5%, increased service cost per customer—77%.

It is evident that during this period the trends effecting the revenue of gas sales per customer have been downward, and the trends effecting the cost of maintaining satisfied customers have been upward. We can assume, then, that if we are selling less gas per customer today than for comparative previous years, this must be attributed to the more efficient gas appliances that have been connected to our lines in later years. I think we may also attribute the increase in the cost of service rendered the customer to the modern automatic, efficiently designed gas appliance.

With tendencies moving toward the lessening of revenues through efficiency, increased service calls, and increased demands on the part of customers for more and better service, it seems that the technical requirements of servicing of gas burning appliances will become increasingly important. If we are to maintain the position in the community as an aggressive business concern, we must give more thought to the hiring and training of our personnel, particularly those in the appliance servicing field.

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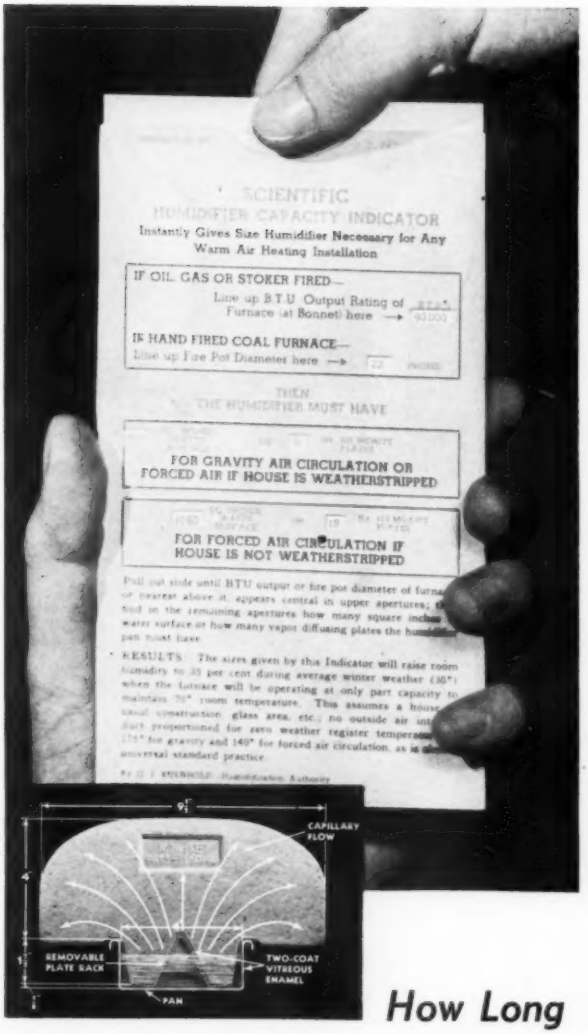
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THEN
THE HUMIDIFIER MUST HAVE
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FOR FORCED AIR CIRCULATION IF HOUSE IS NOT WEATHERSTRIPPED
RESULTS
CAPILLARY FLOW
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Active Discussion and Counter-Appliance Display Feature Hotel, Restaurant & Commercial Sales Meeting

Emphasis upon modern gas counter-appliance sales techniques, and upon trends in the quantity cookery, baking and commercial heating fields which are affecting non-residential gas sales, characterized the 1941 A.G.A. Hotel, Restaurant and Commercial Sales Conference, held at the Palmer House, Chicago, April 24 and 25, and attended by about 150 executives, utility sales managers, industrial gas men, and appliance manufacturers from 18 states. The significance of the subjects discussed was demonstrated by unusually active discussion from the floor by heavy participation in the three round table discussions scheduled on the afternoon of the second day.

Another outstanding feature of the meeting was a handsome display of 28 representative gas-fired counter-cooking appliances of latest design, produced by 17 manufacturers, and arrayed in a room adjacent to the meeting hall. In view of the facts (1) that many appliances of this type are not too familiar to most gas men, (2) that the potential gas load they represent is so considerable, and (3) that at no other meeting or display during the year is such a complete group of gas counter appliances assembled for inspection, there was almost constant traffic and discussion about the display except during the formal sessions.

George F. B. Owens, Vice Chairman of the A.G.A. Industrial and Commercial Gas Section, and Assistant Vice President of The Brooklyn Union Gas Company, opened the Thursday morning Sales and Utilization Session by reading the regrets of Section Chairman H. Carl Wolf, who was unable to attend as a result of sudden family illness. Mr. Owens led the meeting and outlined "The Chairman's Views on Hotel, Restaurant and Commercial Gas Sales," observing that the most intricate and difficult phase of utility sales was, in his opinion, that which this Conference was dedicated to study. Notwithstanding, the hotel, restaurant and commercial load, according to Mr. Owens, is so large, profitable and rich in possibilities for development, that no effort should be spared in doing the best possible job in this quarter.

First formal speaker of the day was E. V. Fineran, Mgr., Industrial Sales Department, Washington (D.C.) Gas Light Company, who described the technique developed by his company in conducting annual Commercial Kitchen Modernization Campaigns, cooperatively involving gas company, equipment manufacturers, dealers, restaurant associations, and, of course, quantity cookery customers. Although such campaigns are unique in commercial gas sales practice (only 3 out of 29 surveyed utilities conducting them), the Washington company urges their wider use on the basis that its third annual effort in this direction resulted in $48,500 of new commercial cooking business directly traceable to the campaign. A 31-page mimeographed summary of all campaign details (and results) was distributed to each conferee.

J. B. Druse, Manager, Commercial Gas Sales Division, Milwaukee Gas Light Company, analyzed "Business Opportunities in the Corner Bakery."

In order to show that gas has played an important part in the evolution of almost every phase of modern retail bakery technique, Mr. Druse referred to improvements in: revolving tray ovens; the application of gas refrigeration to dough retardation, ingredient storage and product display; batch and continuous doughnut frying by gas; gas-fired oven steamers; gas-fired proof boxes; and gas water heating for cleaning and pasteurizing. He concluded with a summary of the gas-fueled-equipment situation among Milwaukee's retail bakers — noting that 47% of the bake shops are served by gas, that 335 retail bake shops use 79 pieces of gas equipment consuming 7 million cubic feet of gas per month, representing 35% of the company's commercial load and 10% of the combined commercial and hotel and restaurant load.

"Progress In Miscellaneous Commercial Gas Equipment Usage" seemed to Lawrence R. Foote, Central Illinois Electric & Gas Company, Rockford, Ill., to hinge upon better market surveys and wiser methods of sales approach. He urged sales activity in this quarter to be organized, not by "type of establishment," but by "type of gas usage"—the reverse of general practice. He further advocated campaigning on *one* type of gas usage at a time to avoid "spreading the butter so thin that it is not noticed." Mr. Foote suggested that the miscellaneous commercial business, so often neglected, may truly become "an anchor to windward" in the future.

Is the Gas Kitchen Cooler and Dryer? — Yes!

By far the most surprising data disclosed at the Conference was that presented by C. George Segeler, Engineer of Utilization, American Gas Association, New York, on the subject of "Is There Excess Heat In Restaurants?—An Analysis of Recent Studies." After reviewing psychometric tests concurrently made in 18 sets of comparable gas and electric kitchens of various types in various parts of the country, it was surprisingly demonstrated that the gas kitchen may actually be cooler and dryer than the equivalent electric kitchen. This is in direct contradistinction to existing belief and advertising claims, and gives the industry invaluable competitive ammunition. It was observed that this condition may result from, among other factors, the better ventilation automatically achieved in the gas kitchen by the flue-connection of gas appliances. Caution was urged in using this potent new sales argument until further demonstrations of its validity and further supporting case history data are collected.

Sell Results and Service — Not Nuts and Bolts

Two successive features of the program brought the meeting up to date on the matter of "Gas In the Food Service Field" — both events sponsored by the A.G.A. Food Service Equipment Committee. The first, a review by Lester A. Dubberke, Milwaukee Gas Light Company and Chairman of the Committee, covered the Committee's three long-range objectives and the desirability of sell-

ing "results and cooking service" rather than "nuts and bolts." It was the speaker's opinion that our electric competition is outdoing us in sales technique if not in equipment, installations, or dollar volume. The second feature involved 9 leaders in the field who conducted an open "bull-session" on the platform under the leadership of Eugene D. Milener, Secretary of the Section. Questions, answers, differences of opinion, and unusual points of view, mainly on subjects not covered by the formal presentations, were given an airing by means of this feature of the program.

By demand, the afternoon of the second day at every A.G.A. Industrial and Commercial Gas Section Conference for the past three years has been devoted to concurrent Informal Round-Table Discussions. The subjects up for idea-interchange at this meeting were "Bake Ovens and Heavy-Duty Cooking Equipment," "Volume Water Heating, Steam Generation and Refrigeration," and "Counter Appliances," led respectively by J. B. Druse, Milwaukee Gas Light Company, Gebhard C. Beck, The Brooklyn Union Gas Co. and Chairman of the A.G.A. Volume Water Heating Committee, and Walter D. Crouch, Robertshaw Thermostat Co.

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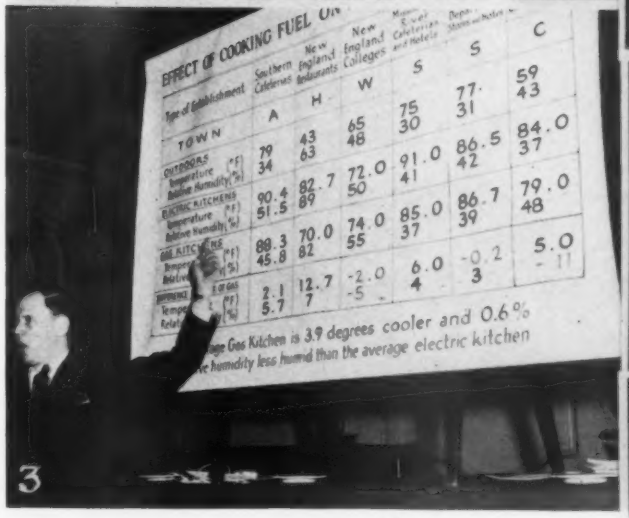

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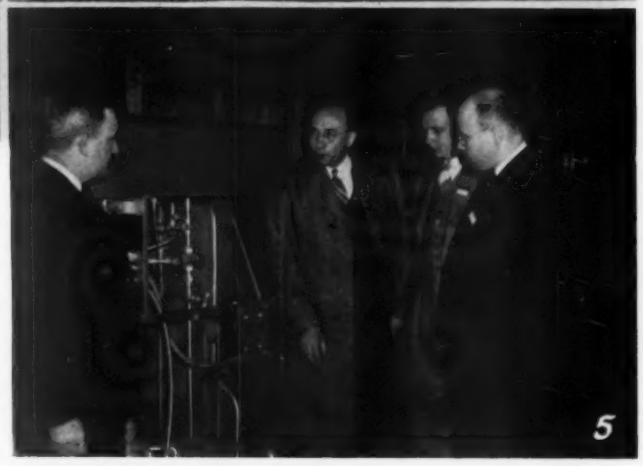
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AT THE HOTEL-RESTAURANT-COMMERCIAL SALES MEETING

1. (l. to r.) Wm. D. Thompson, Mgr., Industrial Department, Laclede Gas Light Co., St. Louis, Mo.; F. B. Jones, Gen. Sales Mgr., Equitable Gas Co., Pittsburgh, Pa.; Waldo W. Schram, Supervisor, Merchandise Sales, Northern Indiana Public Service Co., Hammond, Ind.; C. H. Lekberg, Industrial Sales Supervisor, Northern Indiana Public Service Co., Hammond; and Hale A. Clark, Industrial Engineer, Michigan Consolidated Gas Co., Detroit, Mich.

2. Five of the nine participants in the feature, "After Adjournment," which closed the platform program of the Conference, and provided an opportunity for the group to discuss subjects of its own selection. (l. to r.): John L. Hall, Gen. Suprv., Commercial Sales, Southern California Gas Co., Los Angeles; Edward V. Fineran, Mgr., Industrial Sales Dept., Washington Gas Light Co., Washington: Walter D. Crouch, Mgr., Industrial & Commercial Div., Robertshaw Thermostat Co., New York; unidentified; and C. George Segeler, Engineer of Utilization, American Gas Association, New York.

3. C. George Segeler, Engineer of Utilization, American Gas Association, New York, making his presentation, "Is There Excess Heat In Restaurants?—An Analysis of Recent Studies."

4. George S. Jones, Jr., Vice President, Servel, Inc., (left), who addressed the Conference on the subject of "Commercial Gas Refrigeration in 1941," poses with his largest customer for commercial gas refrigeration Fred C. Neuls, Commercial Sales Mgr., The Brooklyn Union Gas Co., Brooklyn. Mr. Neuls' company has already installed over 100 commercial gas refrigerating units in taverns, restaurants, butcher shops, delicatessens, florists, and bakeries.

5. Interested spectators at the equipment display held in conjunction with the meeting were (l. to r.) Lee T. Bond, Sales Mgr., Public Service Co. of Northern Illinois, Kankakee, Ill.; Henry O. Loebell, Mills Novelty Co., Chicago, Ill.; W. D. Mastin, Robertshaw Thermostat Co., Chattanooga, Tenn.; C. F. Henness, Gen. Suprv., Gas Sales, Public Service Co. of Northern Illinois, Chicago, Ill.

AT THE
DISTRIBUTION
CONFERENCE
PITTSBURGH
APRIL 21-23
1941

(1) C. S. Goldsmith, Vice Chairman, Distribution Committee, Brooklyn, N. Y. (2) Left to right: F. L. Henderson, Houston, Texas; T. H. Kendall, Pittsburgh, Pa.; J. H. Collins, New Orleans, La.; G. J. Heckendorn, Denver, Colo. (3) Left to right—(seated): J. D. von Maur, Toronto, Ontario; J. B. McNary, President, Canadian Gas Association—(standing) H. L. Gaidry, Vice Chairman, Technical Section, New Orleans, La.; L. W. Tuttle, Chairman, Distribution Committee, Oak Park, Ill. (4) Left to right—(seated) C. F. Sucher, New Haven, Conn.; H. G. Horstman, Chairman, Appliance Servicing Committee, Indianapolis, Ind.; F. W. Batten, Binghamton, N. Y.—(standing) W. T. Shinholser, Columbus, Ohio; J. M. Pickford, Hammond, Ind.; C. S. Goldsmith, Vice Chairman, Distribution Committee, Brooklyn, N. Y. (5) Left to right—(seated) L. W. Tuttle, Chairman, Distribution Committee, Oak Park, Ill.; R. H. Clark, Chairman, Motor Vehicle Committee, New York;—(standing) R. F. Norris, Mt. Vernon, New York; Randolph Whitfield, Atlanta, Ga.; Jean Ray, Richmond, Va.: W. A. McCutcheon, Washington, D. C. (6) Left to right: Elliott Taylor, "Gas"; H. O. Andrew, "Gas Age"; Miss Information (Gladys Hanshaw) A. G. A. Headquarters.

—Photos A. Gordon King

At the Luncheon Conference on Meters and Metering. Left to right:—H. S. Harris, Los Angeles; A. W. Fuller, Chairman Sub-Committee on Meters and Metering, New York; B. F. Worley, Houston, Tex.; J. E. Overbeck, Columbus, Ohio.

During visit to Pittsburgh Equitable Meter Co. plant: Left to right:—Jesse S. Yeaw, Rochester, N. Y.; L. E. Knowlton, Chairman Gas Production Committee, Providence, R. I.; G. L. Bristol, Greenwich, Conn.

Photos A. Gordon King.

One of the program features at the Conference was the inspection trip and buffet supper arranged at the factories of the Pittsburgh Equitable Meter Company on Monday, April 21. The delegates were taken by buses in mid-afternoon from the hotel headquarters to the offices of the EMCO organization. Here they were split into small groups and conducted through the plant by guides chosen from among the meter company employees.

For a majority, this was the first opportunity to view a large meter and regulator factory in operation. Much interest was shown in the machine tool equipment used and in the modern facilities available for mass production.

Following the tour a Buffet Supper was served to the 365 present in a large cleared area of the company's offices.

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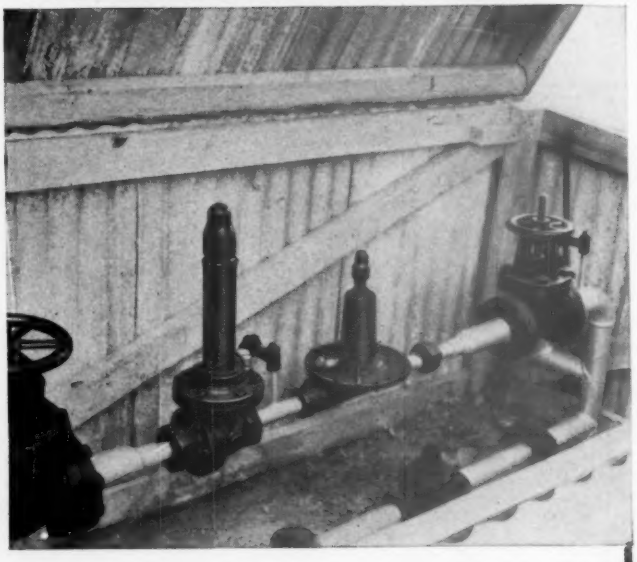
AMONG THOSE VISITING PITTSBURGH EQUITABLE METER PLANT

(1) Left to right: Colonel W. F. Rockwell, Pittsburgh Equitable Meter Co.; Frank Mueller, Mueller Company; G. Bowen, Mueller Company. (2) L. to r.: William Foley, Metropolitan Utilities, Omaha; Mr. Hensen, Metropolitan Utilities; Burgess Manchester, Metropolitan Utilities. (3) L. to r.: A. D. MacLean, Pittsburgh Equitable Meter Co.; Gordon Stuart, Equitable Gas Co., Pittsburgh, Pa.; Henry Harris, Southern California Gas & Electric Co.; Robert Finley, Dayton Power & Light Co.

Pipe Coatings: Bulletin 6 of Wailes Dove-Hermiston, Westfield, N. J., in describing their enamel coatings gives some details of a 20" material gas line in the middle west, the entire 165 miles of welded construction being coated in the field with Bitumastic primer and enamel. Method of application is described.

Coordinated GAS CONTROL . . . Insures . . . . MAXIMUM EFFICIENCY



A Double Reduction High Pressure Installation near West Lake, La. United Gas Corporation, Lake Charles, La.

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PLAINFIELD, NEW JERSEY

The U. G. I. Gum Filter and Its Effect On Service

By
C. C. Winterstein
and H. D. Lehman

I. General Nature of Gum Problem and Development of Filter

A LITTLE MORE than ten years ago the manufactured gas industry faced a serious situation involving the rapid stoppage of gas appliance control equipment by a resin or gum-like deposit. The precise nature of that deposit and more especially the cause of its formation proved a very baffling question but finally, after several years of intensive research, the story was unfolded.

For the needs of this paper* it will suffice to touch only lightlv on that story. It has been presented in detail before. Our main purpose here, is to discuss a successful remedial measure in the form of a filter for the interception of gum before it reaches the control equipment and to present some field data on the results that have been obtained by it.

It had early been established that gum existed in the gas as a solid in the form of spherical particles of microscopic size in the "suspensoid" state. These particles were known to be finer than those of tobacco smoke.

Nitric oxide (NO) which appears in the gas at the source of generation, whether water gas sets, coal retorts or coke ovens, is the cause of gum formation. The amount of nitric oxide in these manufactured gases is very small ranging from practically zero to several grains per 100 cu. ft. It was once believed that if nitric oxide was held to not over one part in thirty-five million parts of gas, the quantity of gum formed would be negligible. This conclusion was later discarded when it was established that the gas would have to be "essentially free" of nitric oxide if all objectionable gum formation is to be avoided.

The nitric oxide is oxidized in the gas to nitrogen peroxide and this reacts with certain hydrocarbons in the gas to form the gum particles. These particles range in size from molecular dimensions when first formed to a size that results in them dropping out by gravity. The smaller particles remain suspended in the gas and pass along through the system. The formation of gum particles is not an instantaneous reaction but is believed to proceed slowly up to a maximum amount after a few hours. Hence gum may form anywhere in the system, even at the appliance.

The molecular particles, as first formed, grow with age due to coalescence. As the larger particles are formed and drop out, the opportunities for the smaller ones to coalesce are diminished. Because of this and a progressively decreased rate of formation, some particles remain suspended for weeks in storage.

The number of gum particles is great, ranging from 20,000 to 100,000 per cc., or a maximum of nearly 3,000,000,000 per cu. ft. in an ordinary gas giving objectionable but not excessive gum trouble.

The diameter of the smallest particle visible in an ultramicroscope is approximately 0.000008 (eight millionths) in.

The diameter of the larger particles is between about 0.00004 (four one-hundred thousandths) to 0.00008 (eight one-hundred thousandths) in.

The average diameter is about 0.00001 (one one-hundred thousandths) in. and at this size, without coalescence, it is estimated that about three months would be required for the particles to drop by gravity through a height of 100 ft. in perfectly still gas. Hence, they could never be expected to drop out of the gas before reaching the appliances since the "life" of the gas is ordinarily only a matter of several hours.

These figures for particle size may be compared to an approximate area of 0.00005 (five one-hundred thousandths) sq. in. for an annular opening of a needle adjustment passing about .2 cu. ft. per hour at 4.5 in. pressure. It has further been estimated that the width of the annulus of needle adjustments on which experiments have been made is 0.00028 (twenty-eight hundred thousandths) in. assuming it is truly concentric Actually many needles give eccentric openings and the annulus may therefore taper in width from zero up. This increases the liability to gum stoppage although the true concentric ring itself is extremely susceptible to stoppage.

Gum particles striking the constricted openings lodge in them and soon build up to the point of causing a complete stoppage.

The actual quantity of vapor-phase gum is ordinarily small,—on the order of 0.022 to 1.1 pounds per million cu. ft.

The amount of gum that will stop up a top burner pilot burner needle adjustment is in the neighborhood of 0.0000003 to 0.0000007 (three to seven ten-millionths) ounces.

Gum particles which pass on through the burner are consumed like any other combustible. Their only known harmful effect is that of obstructing constricted openings chiefly in pilot adjustment devices and the smaller graduated controls.

Paralleling with comprehensive investigations underway to ascertain the cause of gum were other investigations to determine how to protect the appliance against it. The thought arose to filter out the gum particles and then followed innumerable experiments to find a practical material that would accomplish that purpose. It was no easy task.

It was recognized that the immediate needs demanded protection against constantly burning small control equipment—especially pilots. Hence, the development of the filter was pursued with pilots and small consuming appliances such as refrigerators and low recovery water heaters in mind. The objective was the provision of a filter that would be adequately compact and of nominal cost.

We shall pass over a detailed discussion of the various earlier types of filters and other gum protective devices that were developed in this experimental work. Some of those devices were produced in quantity

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*Certain of the data presented herein have been taken from the following three previously presented articles.

The Development of a Non-Stop Pilot Control, E. J. Brady, 1933.

Gum Deposits in Gas Distribution Systems, Jordan, Ward and Fulweiler, 1934.

Robot Chemists, W. E. Stackhouse, 1939.

Paper presented at the Operating Division, New England Gas Assn., Worcester, Mass, May 7th, 1941.

and installed in the field. Depending on the design, they were in due time judged unfavorably for general distribution because of such factors as high cost, bulkiness, susceptibility to failure by dirt stoppage, low capacity, sealing difficulties, etc.

Finally the present type of filter was evolved. The design appears simple enough but, as you may have gathered, it was completed only after a tremendous amount of experimental work had been executed. To insure its performance, the selection of the right type of filtering material and its packing in the filter case has been necessary. This single phase of the problem alone has demanded an unusual expenditure of laboratory time and effort.

Having selected the correct filtering material and having provided the necessary instructions for its assembly within the casing, the work of the laboratory is thereafter extended to making check tests on random selected sample lots removed from production runs. Initially 100 filters are taken from the first 1,000 filters produced. Thereafter 10 filters out of every 1,000 production are tested both for capacity and gum removing performance.

A careful check of the gum removing performance of the filters is made by the laboratory. For this purpose a special apparatus using a specially prepared aged gas is used. This apparatus permits the determination of the passage of the most minute particles of gum and if any gum passage is revealed the filters are rejected. Fortunately there has been very little occasion for rejecting filters as the filter manufacturers have closely adhered to the specifications and have cooperated in every way to insure a perfected product. The practice of the laboratory checking the filters has served to preclude the release of defective filters.

Besides routine testing of production filters the laboratory is also actively engaged in periodically checking the performance of filters in service. A number of such filters were pre-tested by the laboratory before being installed and are removed from time to time for re-test. The results have been highly satisfactory as no substantial reduction in capacity over as much as 3 years of service has been observed. This finding, combined with general field observations, leads to the belief that a much longer life than the originally estimated 8 or 10 years will be attained.

In addition to the primary purpose of the filter to remove gum it also serves to remove all dust and other foreign particles. This incidental advantage is contributing to the trouble-free performance obtained from filter protected equipment.

It is certainly no over-statement to say that the gas industry today, with its large number of pilots already on the lines and being installed in constantly increasing degree, is vitally concerned with the uninterrupted performance of pilots. Clearly, the countenancing of any condition which gives rise to a risk of pilot interruption is inviting near disaster so far as public acceptance of gas is concerned. Gum trouble is in this category. This fact has been unfortunately clearly proven in some situations where gum troubles reached proportions that gave rise to very critical situations.

Since the time when the cause and nature of gum depositions were identified, betterments have been made in the control of the conditions giving rise to the gum trouble but to the best of our knowledge the situation has not been so greatly bettered by plant control that precautions need no longer be observed by added protection at the appliances. In fact, no immediate solution for the complete elimination of gum formation appears at hand.

It is also believed that the sudden appearance of gum in controls may result from other factors than the formation of gum in the gas from the time it leaves the works. In addition we may be so bold as to even include possible slip-ups in plant control which could result in gum epidemics of serious proportions.

The appearance of gum trouble therefore remains a major problem —one that can only be satisfactorily met or guarded against by the use of gum protective devices at the appliances.

II. Effect of Gum Filter on Service

So far as Philadelphia is concerned, the problems involved in vapor phase gum deposits were first and forcibly brought to our attention in the summer of 1930 by a proportionately substantial epidemic of outages on gas refrigerators. At the time of this experience, our greatest concern resulted from the customer-reaction which naturally developed from these interruptions of refrigeration. For it seemed to us then, and seems to us now, that even more important than the question of cost was, and is, the question of the naturally unfavorable reaction developing in the customers' minds and the not unnatural inclination going with it to consider competitive sources of energy.

With the development of an effective and practical gum filter, it is now possible to completely eliminate this source of irritation to customers and potential loss of load—certainly to the extent that it is possible to have filters installed.

Second only, in our judgment, to the question of effect on customers and on the gas load is the effect of the increased service calls on servicing costs. With the development and general use of automatic appliances, the interruptions of pilot and small flows has been one of the most important, if not the most important single item contributing to increased servicing costs. Obviously, therefore, the development and use of a device such as the gum filter, which materially reduces such calls, and therefore such costs, is of maximum importance from this standpoint. In Philadelphia, this fiscal year—ending August 31, 1941—based on results to date, our total servicing costs will be considerably less than 4 years ago, despite the addition to our lines of approximately 26,500 refrigerators, 120,000 fully or partially automatic ranges, several thousand automatic water heaters, and 1,600 house heaters, and despite increase in substantially all of the items that go to make up the charges to these accounts.

It would not be correct to say that all of this very marked improvement is due to the adoption of a filter. In our judgment, however, it is quite fair to say that the principal item causing this betterment results from improvement in the gum situation, of which the most important single factor is the more general use of the filter. In this connection, it is important to bear in mind that, were it practicable to equip all appliances now in use with gum protective devices, the savings would be markedly higher.

Below are given some more specific results, based on detailed analyses:

Ranges

In Philadelphia, approximately 40 per cent of the calls on ranges equipped with automatic top lighting result from the pilot when the latter is unprotected by a filter. Detailed analysis made on several occasions over a period of time, including a recent one on 2,000 ranges equipped with filters, shows that ranges so equipped, that is, with pilot filters, have one-fourth of the calls involving pilots that ranges not equipped with filters have.

This, of course, is a striking betterment and is a major contribution to improvement in customer-relations and reduction in service costs.

Refrigerators

Of our 40,500 air-cooled refrigerators, 27,000 are equipped with filters and 13,500 are without. Detailed analysis of refrigerators equipped with filters, compared with those not equipped, shows a reduction attributable to the filter of 0.3 of a call and 50 cents per year per box. This is even more significant when it is realized that last year our average calls per air-cooled refrigerator was only a total of 0.8 of a call.

Based on the results of the eight months to date, the cost of servicing an air-cooled refrigerator will this year be something less than half of what it was a few years ago. Naturally, not all of this improvement is due to the filter, a number of other factors of importance coming in. However, our data clearly indicate that, again, the most important single factor in this improvement is the use of a gum filter.

Automatic Water Heaters

In the case of automatic water heaters, detailed analytical data show a saving on water heaters equipped with filters against those not equipped of approximately 1/5 of a call per year, or about 35 cents per water heater per year.

House Heaters

About a year ago, because of the very material assistance of the filter in cutting calls and cost on other appliances, we adopted a requirement that all house heaters coming into Philadelphia, whether or not sold by us, must be equipped with filters. It is obviously too early to give definite data on this particular application, but it is quite clear to us that it has been an important factor in materially reducing pilot complaints.

Without going into detail, a general statement on our policy on filter installations in Philadelphia is that one is installed on every appliance sold by us in the city of Philadelphia, and on as many dealers' sales as possible, with the exception of certain automatic water heaters with reducing thermostats, where a filter of adequate capacity is not yet available.

On existing installations, where individual case histories justify, filters are cut in on the job. Since the institution of this latter policy, approximately 5,000 filters have been so installed in customers' homes on repeat complaints.

The question of cost of installation naturally comes into the picture. On new refrigerators and water heaters, the cost of installation is substantially nil, and the total cost involved is approximately that of the filters, which, in the case of the smaller one is 25 to 30 cents, and, in the case of the larger one, is 83 to 88 cents, when bought in lots of 1,000. This statement is likewise nearly true in the case of new house heater and conversion burner installations. In the case of new gas ranges, the manufacturers install these for us at the factory and increase the price of the range to the Company by 50 cents.

In conclusion, after a rather broad experience extending over a period now approaching five years, with a total filter installation now approaching 100,000, we are convinced that the use of a properly-designed filter is a very profitable thing from the economic standpoint and of great importance as an aid in protecting the gas load from competitive inroads, and, in our judgment, the development of a satisfactory filter, which protects the stability of pilot and small flows, is the most important operating advance in the manufactured gas business in the last decade.

FOR *want of a nail the shoe was lost; for want of a shoe the horse was lost; and for want of a horse the rider was lost; being overtaken and slain by the enemy.* What Franklin said 200 years ago applies today thruout the land. It means doing one's job well, whatever it may be. Purification, a small but vital link in gas production, is just one of those "horseshoe nails" that mean so much. Here economy *plus reliability* count—and that is why the gas industry in the past year repeat-ordered over 1,500,000 bushels of GPM Iron Hydroxide.

Gas Purifying Materials Co.
Long Island City, New York

GPM
IRON HYDROXIDE

The 34th Annual Convention of Canadian Gas Association

The 34th Annual Convention of the Canadian Gas Association, held in Hamilton, May 20th and 21st, turned out to be a real success with the attendance somewhat larger than anticipated.

From first to last there was a full program of interesting and practical papers and addresses, with outstanding speeches by Major T. J. Strickler, President, American Gas Association, who spoke on the mutual understanding between Canada and the United States in the present emergency, while Mr. Edward J. Tucker, General Manager, Consumers' Gas Company of Toronto, spoke on a similar subject under title of "Our Job In The Present Emergency."

Mr. John Keillor, Gas Engineer, British Columbia Electric Railway Company, Vancouver, B. C., gave a review of Canada's gas standards position over the years and strongly advocated further study of this problem with the view of eventually having a standard of gas manufacture in Canada that would be flexible and meet the needs of every utility in the Dominion.

Among the papers presented were "Mass Production for Gas Appliance Sales," by A. E. Lee, Assistant to the President, Servel Incorporated, Evansville, Indiana.

"Water Heating in Reverse," by A. J. Strain, Superintendent of Domestic Sales, Consumers' Gas Company of Toronto.

"Gas in Industry," by M. J. Gardner, Supervisor Industrial Gas Division, Montreal Light, Heat & Power Consolidated, Montreal.

Mr. Gardner touched on many phases of the industrial gas business. He emphasized strongly its value to every gas company, and gave some very practical ideas on how this business can be built up in every gas served city and town in Canada. "Do not neglect the small industrial gas possibilities," he stated. "No possible outlet for use of gas, no matter what the consumption, should be overlooked."

Wednesday morning's session was taken up with the work of home service departments of various gas companies in Canada and the United States. This part of the convention proceedings was carried on under the able chairmanship of George L. Schofield.

Miss Jessie McQueen, Home Service Councillor, American Gas Association, New York, opened the home service session and spoke on what the A.G.A. was doing to help companies and the gas industry along home service lines.

The following officers were elected for the current year. President:—W. J. Pead, Jr., Chief Engineer Gas Department, Montreal Light, Heat & Power Co., Montreal, Que.; 1st Vice-Pres.—Frank D. Howell, Division Supt., Dominion Natural Gas Co., Ltd., Brantford, Ontario; 2nd Vice-Pres.—Alan H. Harris, Jr., Manager Gas Utility, Winnipeg Electric Company, Winnipeg, Manitoba; Secy-Treas.—George W. Allen, Gas Survey Engineer, 7 Astley Avenue, Toronto 5, Ontario, Canada.

It is planned to hold the 1942 Convention at Montreal early in June.

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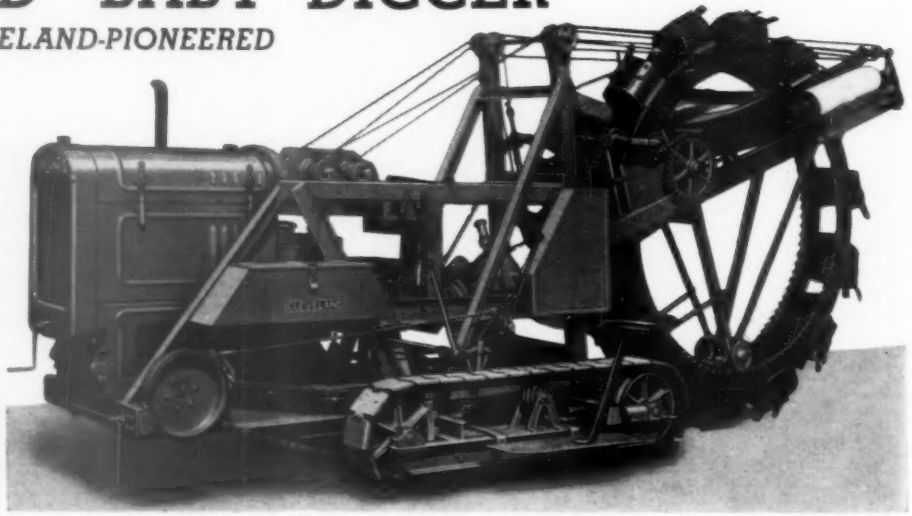

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Some New Facts on Liquid Phase Gum

By
Dr. T. H. Mighill

Research Chemist
Blackstone Valley Gas & Electric Co.

THE SUBJECT of gum in spite of its age, is undergoing a revival today. Several years ago attention was largely focused on vapor phase gum, and in the few following years the method of its formation and its behavior were completely covered. I think that today more valuable information is at hand concerning this phase of gum than is available on liquid phase gum. Interest is now more concentrated on liquid phase gum owing to increased use of heavy oils in making water gas. It is to this form of gum that I am going to give some thought.

What is the substance we call liquid phase gum and how can we identify it? It has been stated that there is no specific test for this form of gum and I think that, in general, this statement is true.

For purposes of argument let me state that there are three points of view regarding gum:—1st, there are potential gum formers and possibly solid gum in solution in light oils; 2nd, there are the more or less solid deposits in meters and on diaphragms; 3rd, there is the resinous matter separable from light oil or deposits by proper manipulation. These resins are soluble in light oil and when the latter has evaporated we have left a sticky mass of gum accompanied by the higher boiling fractions of light oil and generally considerable naphthalene. Oxidation has often taken place. Nitrogen and sulphur are often present in small amounts. The following are complete analyses of resins which I have isolated. These came from three plants and from four different localities in the plants.

Plant No. 1, light oil removed from gas by cooling with dry ice.

Carbon	**89.60%**
Hydrogen	**8.40**
Nitrogen	**0.13**
Oxygen	**1.09**
Sulphur	**0.38**
Ash	**0.40**

This resin seems to consist almost entirely of polymerized styrene and indene.

Plant No. 2, light oil scrubbed from high pressure gas with straw oil.

Carbon	**87.35%**
Hydrogen	**10.52**
Nitrogen	**0.11**
Oxygen	**1.48**
Sulphur	**0.53**
Ash	**0.01**

Plant No. 2, condensate taken from the holder.

Carbon	**84.41%**
Hydrogen	**7.46**
Nitrogen	**0.26**
Oxygen	**6.56**
Sulphur	**0.91**
Ash	**0.40**

Plant No. 3, condensate from low pressure drips.

Carbon	**72.70%**
Hydrogen	**8.48**
Nitrogen	**0.26**
Oxygen	**5.33**
Sulphur	**13.20**
Ash	**0.03**

The high sulphur is probably due to inefficient purification of the gas.

Plant No. 2, light oil from high pressure drip.

Carbon	**59.20%**
Hydrogen	**6.74**
Nitrogen	**1.04**
Oxygen	**30.64**
Sulphur	**0.23**
Ash	**2.15**

Absorption of oxygen has taken place through long standing under pressure.

Other analyses may be found in the literature. Analyses like the above are tedious but they show better than any other methods whether the gum in question is due to polymerization alone or also to oxidation. There is also a suggestion that sulphur plays a role in the formation of gum which has not as yet been investigated.

It has been recognized for a score or more years that these resins are formed by the polymerization of two unsaturated hydrocarbons, styrene and indene. Each of these bodies has a strong affinity for oxygen and there is at times enough oxygen in the gas to enable oxidized gum to form.

While a few low boiling gum formers exist they are not likely to occur in any significant amount in ordinary light oils.

I have used the method proposed by Dr. Ralph Brown for determining styrene and indene for several years. For the fractionation I use a twelve bulb distilling column with pear shaped bulbs. I have also used the Young and the Vigreaux columns. With the last two it is necessary to lag the column with a towel or other suitable material in order to reach the higher temperatures of the distillation. Operating this way the fraction distilling between 140°C and 160°C contains the styrene and the fraction 160°C to 190°C the indene. The residue is now transferred to a Claissen flask and an air cooled condenser added which in turn is connected to a vacuum receiver. By so doing a reduction of about 100°C in the boiling points of the remaining oils is attained which minimizes the formation of gum by heat.

The naphthalene distills at a pressure of ¾ inch vacuum at slightly over 100°C. By chilling the distillates with ice practically all of the naphthalene can be recovered by filtering the deposited crystals on a suction filter.

The gum remaining in the flask is liquid while hot but on cooling it will solidify. The flask should be tared before the distillation and by weighing after the distillation the amount of resin can be determined. The liquid resins can be poured out of the flask for further examination.

There is an uncertainty whether the resin is already formed in the light oil or whether it is formed by heat during distillation. By completely distilling the oil in vacuo, gum is always found so the inference is that it existed in the oil before distilling. The use of gum inhibitors in the distillation may help answer this question. Already practical use of inhibitors at Baltimore in preventing formation of gum in recovering scrubbing oil has been attained.

The styrene and indene fractions are brominated in solution in carbon tetrachloride to a brown end point which persists for half a minute. The Francis method can also be used. The reagent used here is a solution of potassium bromide and potassium bromate, which liberates bromine on acidifying. The use of sulphuric acid to remove the gum formers is

Paper presented at the Operating Division, New England Gas Assn., Worcester, Mass., May 7th, 1941.

not to be recommended as the handling of sludge and emulsion is very difficult.

I have found even when using pure styrene and indene that the values obtained by using the above method are invariably too low. The same is true with the Francis method. However, if the bromination is carried out in a weak light and the solution cooled with ice, an excess of bromine added and allowed to stand for a half an hour, correct results are obtained. Substitution of bromine for hydrogen does not occur to any serious extent as I have shown by tests for hydrobromic acid.

Pure styrene I prepared by decomposing cinnamic acid by heat, steam distilled the product, and fractionated the dried oil in vacuo. Pure indene I prepared by treating the indene fraction of light oil heated on a water bath with the calculated amount of picric acid very carefully added. It is very essential not to let the temperature rise above that of boiling water on account of the danger of decomposing the picric acid. On cooling indene picrate deposited, which was filtered on the suction pump and crystallized from benzole. When the crystals gave the right melting point they were decomposed by steam and the oil steam distilled at the same time. From the aqueous distillate the indene was extracted with petroleum ether. This procedure is a possible way of testing for indene in light oil but it is not to be recommended as it is time consuming as well as somewhat dangerous.

What was found to be true for pure indene and styrene was also true when the indene or styrene was diluted with paraffins from which all unsaturates had been removed. Check tests made by changing styrene to the bromide and indene to the picrate showed that the modified bromination method gave practical results. To show the ease with which olefines are brominated some amylene was prepared by treating amyl alcohol with sulphuric acid and rectifying the product. This was quickly and easily brominated to saturation in a few minutes.

One of the distinguishing tests between vapor phase and liquid phase gum has been that vapor phase gum is soluble in sodium hydrate. However, as I have found much liquid phase gum to also be soluble in caustic soda, I do not believe this proposed test to distinguish between the two forms of gum to be valid.

One property of liquid phase gum is its insolubility in alcohol, or its precipitation from solution on adding alcohol. This test will distinguish gum from tar, pitch, or naphthalene. The gum resins are generally dark colored but sometimes as light as shellac. Thin edges are generally red by transmitted light. On burning, the resins give off an aromatic odor and not the acrid odor of burning pitch or tar.

To determine whether light oil contains gum formers tests for styrene and indene must be made. First, distill the light oil and save the styrene and indene fractions.

There is really no good test for styrene. The most practical one seems to be to form the bromide, crystallize the latter from alcohol, and determine the melting point. The best known test for indene is to brominate the oil and boil with water. Separate the oil left by filtration and cool. If indene is present, fine needle-like crystals of indene oxy bromide will be deposited and their melting point determined.

The refractive index of indene is unusually high but unfortunately it can not be approached until pure indene is all that is present. So this test is of little value.

Indene is said to form a compound with metallic sodium. However, its formation is uncertain and decidedly risky as I have learned.

Last year I developed a very sensitive test for indene which I have proved by the use of pure styrene, pure indene, and amylene to be due to indene alone. Having obtained the indene fraction from light oil by distillation this test is easy, delicate, and takes but a few minutes to perform. It is as follows.

Take any suitable dry cylinder of glass, a 100 cc oil bottle is very good, and put in it 10 cc of acetone. Then add a drop of the suspected indene. Then add five small pellets of potassium hydrate. No apparent change will take place. If, now, a cc of chloroform be added and the bottle gently shaken, in a few seconds a beautiful blue color will develop. This blue will be quite deep if any considerable amount of indene is present. This seems to be a condensation phenomenon but, unfortunately, the blue color is transitory as the condensation, if it be one, proceeds further and the blue is followed by a yellow color and generally winds up with a white or gray color. However, the blue color lasts long enough for positive identification. For this reason I have not been able to develop any quantitative procedure therefrom. If one drop does not bring the blue, several drops can be taken.

The blue color produced can be permanently imitated by dissolving 3.0 gs of crystals of copper sulphate in 50 cc of water and adding 1.0 cc of a solution of one gram of potassium permanganate in 1000 cc of water.

The same procedure gives an excellent test for carbon bisulphide in the first runnings of light oil, only in this case the color is a fine orange and quite permanent.

The following information may be useful to any experimenter—

	Naphthalene	Styrene	Indene
Sp. Gr.	1.145	0.907	1.006
Melting point	80°C.		—2°C.
Boiling point	218°C.	146°C.	182°C.
Refractive index 25°C.		1.5440	1.5747
Styrene bromide, M.P.	73°C.		
Indene oxy bromide M.P.	131°C.		
Picric acid, M.P.	122°C.		
Naphthalene picrate, M.P.	149°C.		
Indene picrate, M.P.	98°C.		

Home Service Conference

A Home Service Conference will be held in Syracuse, New York, on July 7 and 8. The conference is sponsored by the Home Service Committee of the American Gas Association in cooperation with the Household Technology Department of the College of Home Economics at Syracuse University.

July 7 and 8 are the opening days of the University Summer School and speakers from the summer faculty will be available to outline recent developments in the field of home economics. The program will include also, representation from home service itself,—through actual demonstrations and practical instruction.

The program in general is devoted to foods and cooking trends; home management, housing and kitchens; customer service and consumer information; and to "Home Service in Action."

Elizabeth Sweeney is an instructor in the Household Technology Department and is well known in home service as a former home service director and also as Chairman in 1937 of the A. G. A. Home Service Committee.

B. C. Power and Gas Co. Extends Customer Service

According to the annual report of the B. C. Electric Railway Co., considerable progress was made by its subsidiary, the B. C. Power & Gas Co., during the past year.

In this department 827 additional customers were connected to the system in 1940 bringing the total to 53,074 at the end of the year. Notwithstanding the competition of sawdust and other cheap wood-refuse fuels, gas sales gained in 1940. Here also an increased utilization of existing facilities was combined with the increase in number of customers, resulting in a gain of 2.6 per cent in the volume of gas sold.

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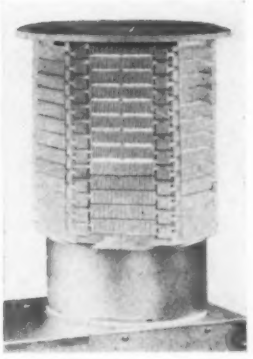

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Progress Report on Liquefaction, Storage and Regasification of Natural Gas

By
John A. Clark,
Chief Engineer
Hope Natural Gas Company,
Clarksburg, West Va.

LAST YEAR at the Atlantic City meeting of the A.G.A., it was my privilege to read a paper describing the development of a new type of storage plant being constructed by The East Ohio Gas Company in Cleveland, Ohio. This paper is a progress report describing the results obtained by the first winter's operation of this plant, and giving some of the conclusions reached after the first winter's practical operation.

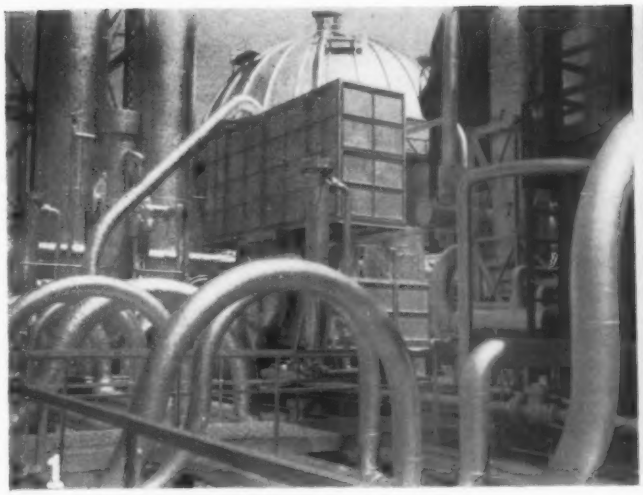
This plant was the outcome of an idea of long standing that some method should be made available to take care of the very few days of extremely heavy load encountered by any natural gas company with a large percentage of its load coming from house heating, without the large expense of laying additional pipe lines. An idea was developed by Mr. Cooper, then president of the Hope Natural Gas Company, that, if a practical method of storing natural gas as a liquid could be developed, the enormous reduction in space occupied, about 600 to 1, might make liquid storage the answer to this problem. With this idea in view, laboratory experiments were carried out for over a year on the behavior of liquid nitrogen and the effectiveness of various materials as insulating material to keep heat from filtering into a tank filld with this liquid at a temperature of around 300° F. below zero. Following the laboratory experiments, a small pilot plant was built at one of the Hope Natural Gas Company's plants in West Virginia, capable of reducing to a liquid around 300,000 cu.ft. per day of natural gas and a storage tank holding slightly under a million cu.ft. of gas in the liquid phase. This plant was operated successfully for about six months, and showed that the idea was perfectly practical and that the loss due to evaporation would not be excessive. As a result of this experience, it was finally decided by the management that it was practical to build a similar plant on a large scale in the City of Cleveland to take care of the rapidly rising sales, occasioned by the steadily increasing number of domestic consumers.

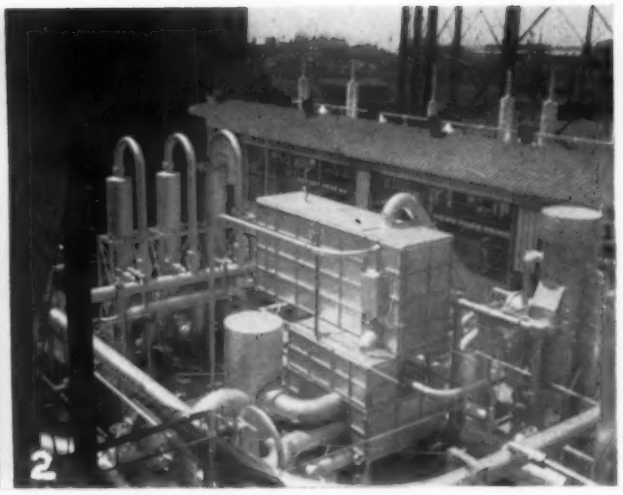
Presented at Transmission Conference, Natural Gas Section of American Gas Assn., Dallas, Tex. May 7th, 1941.

At that time careful studies were made of two or three different methods of liquefying the gas, and it was decided that at least two of them had about equal possibilities. However, after weighing the disadvantages and advantages of each, it was finally decided to use the Cascade System where the temperature is progressively reduced by using; first an ammonia condensing circuit, then an ethylene condensing circuit, and finally a natural gas condensing and expansion circuit. Before attempting to liquefy the gas, it was found necessary to completely remove all traces of carbon dioxide and water, which was done by passing the gas through an amine solution and finally drying it with granulated alumina. It was also found to be of very great importance to remove every trace of lubricating oil put into the gas while being compressed. The plant was designed with a capacity to turn into a liquid 4,000,000 cu.ft. of natural gas per day, and to do this required 3,250 horse power divided up into 600 H.P. for raw gas compression, 950 H.P. for recycling gas compression, 1200 H.P. for ethylene compression and 500 H.P. for ammonia compression.

The plant was practically completed, in all essentials, on January 29, 1941, and operation was started at once, and on February 7th the first production of liquid gas was started. This late start, which was due to the inability of some of the equipment manufacturers to make deliveries on schedule, fortunately, did not cause any difficulty as we had a very unusual winter with no cold waves of any importance in December or January. However, the first cold wave hit on February 19th, and at that time there were 15,000,000 cu.ft. of liquid gas in storage, and on February 19th 7,000,000 cu.ft. were regasified and put back onto the lines and about 4,000,000 cu.ft. on February 20th. On February 21st the weather moderated and it was possible to go back to liquefying again, and on March 17th, when the most severe cold wave of the winter hit Cleveland, there were 50,000,000 cu.ft. in storage. During the two days of this cold spell, the plant fully justified its construction, as 16,000,000 cu.ft. were regasified and put back into the city plant on March 17th and 5,000,000 cu.ft. on March 18th. Due to the inability to foresee what was ahead in the way of weather, and the desire to conserve all liquid possible, only the minimum amount necessary to keep operating conditions normal was used. The result to the gas company of this plant was the ability to handle without curtailment an industrial load of over 40,000,000 cu.ft. per day, which most certainly would have been curtailed or shut off for at least two days, with the resultant loss of confidence on the part of the industrial users. Due to the wide variation of the hourly load curve for any one day, it was found that the use of 25,000,000 cu.ft. of liquid during the daylight hours would enable the company to carry an extra connected load of around 40,000,000 cu.ft. per day. The regasification of the liquid was not started until the pressure in the city plant had started to decline materially, and its use was apparent in a few minutes, and eventually extended back through the main city belt lines over 15 miles. It also developed that the gas fed directly at the point of consumption was much more useful than if fed at any other point, as here it was all clear gain, with no added congestion in transmission lines loaded to capacity.

In regard to the cost of the plant, the figures are not very complete at the present time, due to the fact that the work was not entirely completed last winter, and several construction accounts are not closed out at this time. However, the final cost will run around $1,250,000 divided roughly into: engines with foundations and buildings, $260,000, the three spheres and piping, $420,000 and the remainder in piping, cooling tower, heat exchangers and auxiliary equipment. Also included was an already





Recent photos of the storage plant of East Ohio Gas Company: (1) General view from platform of Machinery building showing vertical Ethylene Storage Tanks, Heat Exchangers and cooling equipment and Sphere No. 1 in the background. (2) A view from the platform of Sphere No. 3 and shows—Left: The 3 Regasifiers with Water Cooling Tower in background. Center: Primary Liquid Tank, upper box containing the 2 main cooling units and lower box containing nitrogen tank and heat exchangers. Right: The vertical Ammonia-Ethylene Heat Exchanger. Background: Compressor and Machinery Building, with Maxim Silencers extending above roof.

installed boiler plant which was reconditioned and put in service. As can easily be appreciated, a great many of the design ideas were entirely theoretical, and every control and safeguard was installed. With the practical experience of the design and operating of this plan, a considerable amount of expense can be eliminated in the next plant. Also a plant built in the heart of a large city required very efficient and expensive muffling for the gas engines, unusual fire protection and also building under union closed shop conditions. Built under the conditions of the average compressing station, the first cost for the next plant can be materially reduced.

Due to the short time the plant was actually liquefying, and the fact that construction work was going on simultaneously, there are no reliable figures on operating costs, but the experience obtained allows a very good estimate of the probable cost of liquefaction and regasification. The plant was designed for and will make, after some tuning up, 4,000,000 cu.ft. per day of the liquid. To fill a storage of 150,000,000 cu.ft. requires a run of 38 days or, allowing for starting and having to cool the piping and tanks down and allowing for a few days delay, say 50 days. To operate the equipment requires four men on a shift, and figuring the fuel gas at an average cost of 38 cents per M.C.F., the cost of filling the three tanks will be; labor $6,000, fuel gas $13,700, oil, ethylene and supplies $4,000, totaling $23,700. The $23,700 divided by 150,000,000 cu.ft. equals 15.8 cents per M.C.F. Now assuming that the plant is started up in October and the storage is full by December 1st, to keep the plant warm for four months will require 38,000 gallons of fuel oil for making steam, while to regasify the 150,000,000 cu.ft. of liquid will require 462,000 gallons of fuel oil or a total of 500,000 gallons, equal, at four cents per gallon, to $20,000. The labor cost of keeping a crew available during the four months will be $12,000, or a total of $32,000. This divided by 150,000,000 cu.ft. gives 21.3 cents per M.C.F. for regasification, making a total for liquefaction and regasification of 37.1 cents per M.C.F.

However, we had expected, that due to a cold wave seldom being of over three or four days duration and then followed by about a week of warmer weather, that it would be possible after a cold spell to refill the tank and to use during a season 300,000,000 cu.ft. of liquid. To do this will require an operating cost for labor, oil, fuel gas, etc. of $73,400, or dividing by 300,000,000 cu.ft. a cost of 24.4 cents per M.C.F. Until the plant has made a full season's, run it will be impossible to say exactly which condition will be the actual one, so, for the present, it seems safe to say that the operating cost will be somewhere between these two figures. In addition to the operating costs, of course, there will have to be added the fixed charges on the first cost of this plant.

One other feature of the plant which was very much discussed during the design was the rate at which heat from the atmosphere would filter into the inner tank through three feet of cork insulation to the liquid at a temperature of around 260° F. below zero, and what the evaporation would be per day while the tanks were standing full of liquid, waiting to be used. From the experimental work and the pilot plant it had been figured out that there would be a heat transfer of about .25 B.t.u. per cubic foot, and using these data we figured that about 500,000 cu.ft. would evaporate per day. At the present time, one tank has stood nearly full of liquid for about three weeks, with all the evaporation from it and the connecting piping going through a calibrated meter. During this time, which included several fairly warm days, the evaporation varied from 105 to 115 M.C.F. per day. Therefore, it seems quite safe to say that the evaporation with all three tanks full will be around 350,000 cu.ft. per day. This would mean that, with all three tanks full, not much over one-half of the liquid would evaporate in the course of a year.

In conclusion, I think I can say that the management feels that this plant has operated successfully for its first year, and has fully justified the money invested in it. Under certain circumstances, there seems to be a definite place in the industry for a plant of this type, and it seems to particularly suit a company with a long supply line and a heavy house heating load. However, it must be realized that it is not a "cure-all," and must be carefully engineered to suit each individual case.

Report on Consumption of Fuel in Manufacturing Establishments For Census Years 1909, 1919 1929 and 1939

FUEL consumption in 169,790 factory establishments in 445 American industries in 1939 is the subject of a report just issued by the Bureau of the Census.

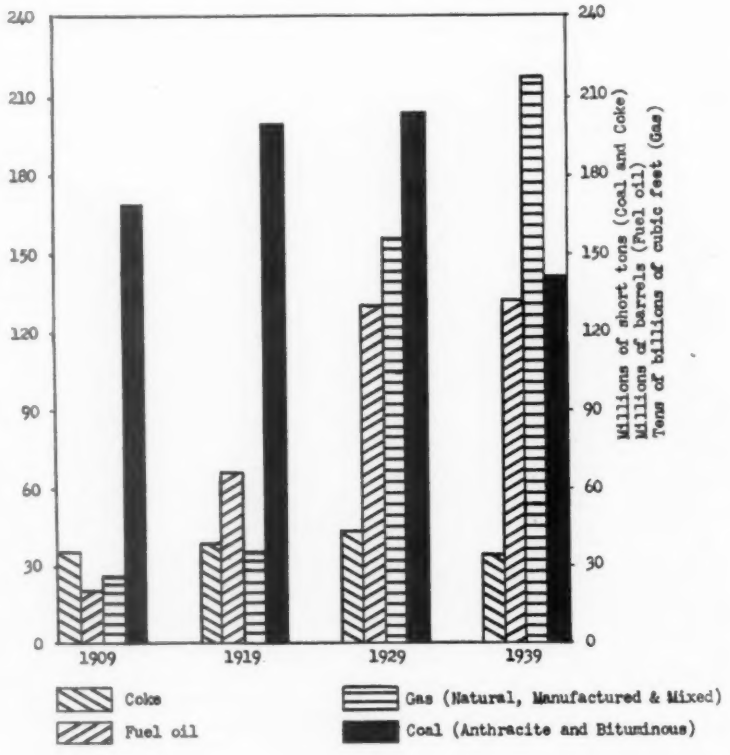
Material reduction in the consumption of coal and coke, slight increase in the consumption of fuel oil, and a large increase in gas consumption is reported for 1939 as compared with 1929. As compared with 1937, however, there was a decrease in all four classes of fuel consumed.

The 1939 consumption of bituminous and anthracite coal combined total 142,787,289 short tons, a decrease of 63,444,734 short tons from 1929, or 30.8 per cent. A continually decreasing consumption of anthracite coal in manufacturing plants has been recorded since 1919. For 1919 the consumption of anthracite coal was reported as 13,735,918 short tons; 9,452,190 short tons in 1929; 6,561,820 short tons in 1937; and 5,015,857 short tons in 1939. Consumption of bituminous coal by manufacturing establishments rose from 188,233,036 short tons in 1919 to 196,779,833 short tons in 1929, but decreased to 162,960,976 short tons in 1937, and 137,771,432 short tons in 1939.

A coke consumption of 35,115,357 short tons was reported for 1939, as against 50,917,737 short tons for 1929, and 42,194,064 short tons in 1937, or a decrease of 31 per cent and 16.8 per cent, respectively.

Fuel oil consumption increased slightly during the decade as a whole, the 1939 consumption of 133,773,524 barrels being 2,861,451 barrels, or 2.2 per cent over 1929, but since 1937 oil consumption decreased by 2,490,520 barrels.

The reported gas consumption in 1939 was materially over that of 1929, but was substantially under that reported for 1937. Gas consumption, including both natural and manufactured gas, totaled 2,195,094,255 M cubic feet during 1939, an increase of 617,814,946 M cubic feet, or 39.2 per cent over 1929, but was 293,887,453 M cubic feet under 1937. Of the 1939 gas consumption, 881,830,178 M cubic feet, or 40.2 per cent, are reported as natural gas; 1,288,727,385 M cubic feet, or 58.7 per cent, was manufactured gas; and 24,536,692 M cubic feet, or 1.1 per cent, was mixed (natural and manufactured). These data on the various classes of gas consumed must be taken with caution since the schedules indicate some confusion among reporting establishments as to the elements entering into the term "mixed gas," which classification includes a mixture only of natural gas and manufactured gas, and not a mixture of two or more classes of manufactured gas. No comparison with prior years is possible in the consumption of the three classes of gas reported for 1939 as data on "mixed gas" was not called for in the 1929 or 1937 censuses.



Heaviest users of anthracite were the 3,138 establishments in paper and allied products industries reporting fuel consumption with 1,039,053 short tons.

Biggest user of bituminous coal was the products of petroleum and coal industrial group, with 63,766,747 short tons of which 61,463,640 tons were used by 83 establishments in the oven coke and coke-oven by-products industry.

The iron and steel, except machinery, industrial group, (8,825 establishments reporting fuel consumption), were leading users of coke with 33,182,227 tons and of natural, manufactured and mixed gas with a combined total of 1,162,698,641 M cubic feet. They were the chief users of manufactured gas

From preliminary report, May 5th, 1941 U. S. Department of Commerce, Bureau of the Census.

with 1,031,991,882 M cubic feet, and of mixed natural and manufactured gases with 8,241,041 M cubic feet. As users of natural gas the iron and steel industries group ranked third with 122,465,718 M cubic feet, the chemical industries group leading with 304,958,406 M cubic feet consumed in 8,106 establishments, and the stone, clay and glass products group industries being second largest natural gas users with 148,074,702 M cubic feet reported consumed in 6,683 establishments.

Reports from 50,122 establishments in the food and kindred products industries gave the following fuel consumption statistics (in 1939) for this group; Anthracite, 738,331 tons; bituminous coal, 10,569,956 tons; coke, 288,266 tons; fuel oils, 11,324,669 barrels; natural gas, 79,132,619 M cubic feet; manufactured gas, 10,156,723 M cubic feet; and mixed gas, 2,107,341 M cubic feet.

Statistics for the other major industrial groups, including the number of factories reporting fuel consumption figures for 1939, were:

Tobacco manufactures (704 establishments) — anthracite, 16,958 tons; bituminous coal, 243,044 tons; coke, 2,807 tons; fuel oils, 36,163 barrels; natural gas, 15,780 M cubic feet; manufactured gas, 20,466 M cubic feet; and mixed gas, 5,351 M cubic feet.

Textile-mill products and other fiber manufactures (5,975 establishments)—anthracite, 507,225 tons; bituminous coal, 5,520,335 tons; coke, 10,885 tons; fuel oils, 9,252,369 barrels; natural gas, 2,718,782 M cubic feet; manufactured gas, 589,132 M cubic feet; and mixed gas, 23,110 M cubic feet.

Apparel and other finished products made from fabrics and similar materials (19,617 establishments) — anthracite, 46,427 tons; bituminous coal, 314,438 tons; coke, 2,620 tons; fuel oils, 436,580 barrels; natural gas, 1,383,370 M cubic feet; manufactured gas, 954,386 M cubic feet, and mixed gas, 127,568 M cubic feet.

Lumber and timber basic products (5,575 establishments) — anthracite, 13,402 tons; bituminous coal, 384,547 tons; coke, 602 tons; fuel oils, 713,577 barrels; natural gas, 231,873 M cubic feet; manufactured gas, 8,700 M cubic feet; mixed gas, 3,569 M cubic feet.

Furniture and finished lumber products (8,006 establishments) — anthracite, 49,289 tons; bituminous coal, 1,406,992 tons; coke, 9,491 tons; fuel oils, 508,002 barrels; natural gas, 2,201,437 M cubic feet; manufactured gas, 229,833 M cubic feet; mixed gas, 68,041 M cubic feet.

Paper and allied products (3,138 establishments)—anthracite, 1,039,053 tons; bituminous coal, 9,195,092 tons; coke, 23,594 tons; fuel oils, 6,696,005 barrels; natural gas, 29,517,668 M cubic feet; manufactured gas, 219,503 M cubic feet; mixed gas, 175,267 M cubic feet.

Printing, publishing, and allied industries (22,308 establishments) — anthracite, 64,668 tons; bituminous coal, 412,703 tons; coke, 2,623 tons; fuel oils, 602,782 barrels; natural gas, 2,189,205 M cubic feet; manufactured gas, 3,250,075 M cubic feet; and mixed gas, 1,041,836 M cubic feet.

Chemicals and allied products (8,106 establishments) — anthracite, 641,495 tons; bituminous coal, 9,658,592 tons; coke, 438,718 tons; fuel oils, 11,492,567 barrels; natural gas, 304,958,406 M cubic feet; manufactured gas, 13,688,560 M cubic feet; and mixed gas, 1,455,204 M cubic feet.

Products of petroleum and coal (952 establishments) — anthracite, 43,735 tons; bituminous coal, 63,766,747 tons; coke, 87,141 tons; fuel oils, 38,260,911 barrels; natural gas, 118,574,027 M cubic feet; manufactured gas, 201,423,993 M cubic feet; and mixed gas, 6,897,146 M cubic feet.

Rubber products (567 establishments)—anthracite, 23,169 tons; bituminous coal, 1,847,679 tons; coke, 686 tons; fuel oils, 670,605 barrels; natural gas, 3,732,453 M cubic feet; manufactured gas, 1,035,782 M cubic feet; and mixed gas, 57,893 M cubic feet.

Leather and leather products (3,276 establishments)—anthracite, 66,768 tons; bituminous coal, 999,183 tons; coke, 226 tons; fuel oils, 394,345 barrels; natural gas, 859,409 M cubic feet; manufactured gas, 83,311 M cubic feet; and mixed gas, 19,872 M cubic feet.

Stone, clay, and glass products (6,683 establishments) — anthracite, 239,112 tons; bituminous coal, 12,223,144 tons; coke, 136,706 tons; fuel oils, 8,112,571 barrels; natural gas, 148,074,702 M cubic feet; manufactured gas, 4,254,393 M cubic feet; mixed gas, 690,655 M cubic feet.

Iron and steel and their products, except machinery (8,825 establishments)—anthracite, 510,949 tons; bituminous coal, 12,262,017 tons; coke, 33,182,227 tons; fuel oils, 33,055,145 barrels; natural gas, 122,465,718 M cubic feet; manufactured gas, 1,031,991,882 M cubic feet; and mixed gas, 8,241,041 M cubic feet.

Nonferrous metals and their products (5,382 establishments) — anthracite, 598,356 tons; bituminous coal, 1,789,626 tons; coke, 420,151 tons; fuel oils, 4,549,520 barrels; natural gas, 36,582,992 M cubic feet; manufactured gas, 11,125,109 M cubic feet; and mixed gas, 839,285 M cubic feet.

Electrical machinery (1,958 establishments)—anthracite, 123,626 tons; bituminous coal, 1,181,882 tons; coke, 13,458 tons; fuel oils, 1,283,928 barrels; natural gas, 3,350,025 M cubic feet; manufactured gas, 2,433,215 M cubic feet; mixed gas, 330,188 M cubic feet.

Machinery (except electrical), (9,272 establishments) — anthracite, 138,988 tons; bituminous coal, 2,443,017 tons; coke, 298,975 tons; fuel oils, 2,992,645 barrels; natural gas, 9,943,553 M cubic feet; manufactured gas, 3,675,812 M cubic feet; and mixed gas, 1,470,230 M cubic feet.

Automobile and automobile equipment (1,061 establishments) — anthracite, 13,196 tons; bituminous coal, 2,561,255 tons; coke, 149,822 tons; fuel oils, 1,621,116 barrels; natural gas, 9,415,003 M cubic feet; manufactured gas, 2,099,581 M cubic feet; and mixed gas, 547,959 M cubic feet.

Transportation equipment except automobiles (915 establishments) — anthracite, 53,249 tons; bituminous coal, 497,064 tons; coke, 40,856 tons; fuel oils, 1,059,316 barrels; natural gas, 1,070,796 M cubic feet; manufactured gas, 400,481 M cubic feet; and mixed gas, 16,784 M cubic feet.

Miscellaneous industries (7,348 establishments) — anthracite, 87,861 tons; bituminous coal, 494,119 tons; coke, 5,503 tons; fuel oils, 710,708 barrels; natural gas, 5,412,360 M cubic feet; manufactured gas, 1,086,448 M cubic feet; and mixed gas, 418,352 M cubic feet.

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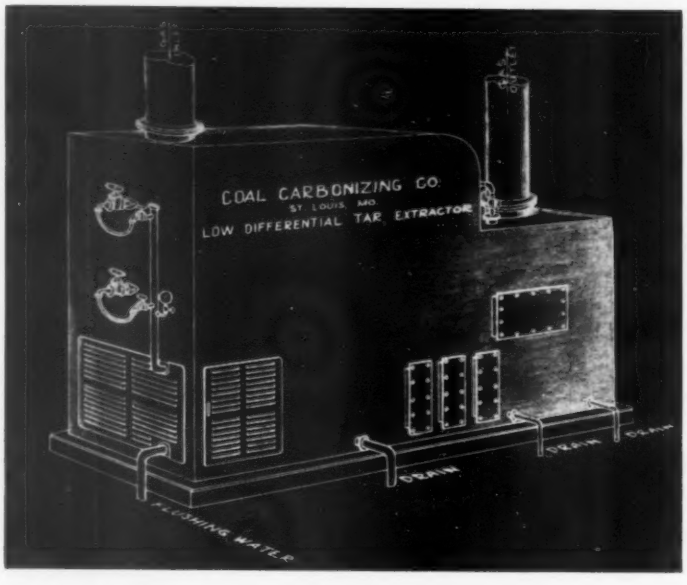

COAL CARBONIZING COMPANY

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A.G.A. Production Conference

At the National Defense Luncheon—Left to right:—C. S. Goldsmith, Vice Chairman, Distribution Committee, Brooklyn, N. Y.; V. J. Altieri, Chairman, Subcommittee on New Developments, Everett, Mass.; Prof. E. S. Pettyjohn, University of Michigan; S. J. Beale, Chairman, Builders' Section, New York; D. P. Hartson, Chairman, Technical Section, Pittsburgh; T. J. Shanley, A.G.A. Headquarters; Luis Hilt, A.G.A. Headquarters; F. B. Cadmus, Consolidated Edison Co. of N. Y., Inc.: V. A. Ogilvie, Gas Advertisers, Inc., N. Y. C.; S. Green, Chairman, Round Table Luncheon Conference.

THE ANNUAL JOINT CONFERENCE of the A.G.A. Technical Section Production and Chemical Committees was held at the Hotel Pennsylvania, New York City, on May 19-21. A total registration of 329 indicates the interest aroused by the well balanced program.

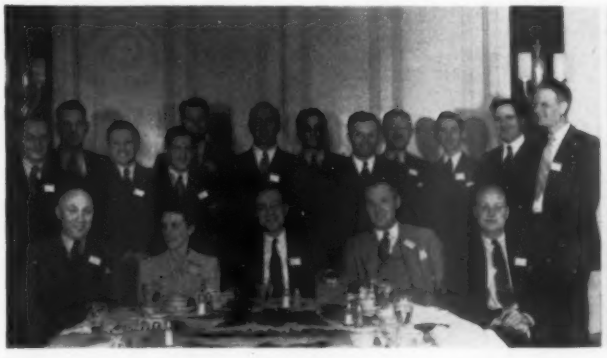
After opening remarks by L. E. Knowlton, Chairman of the Gas Production Committee, the greetings from Major Alexander Forward of the A.G.A., W. Cullen Morris, A.G.A. Representative on the National Civilian Protection Committee, discussed the information which had been secured from England on civilian and utility property protection, particularly in connection with air attack.

A paper on "Progress on the Operation of a Liquid Gas Plant for the Storage and Regasification of Natural Gas," prepared by J. A. Clark of the Hope Natural Gas Company, was read by Geo. W. McKinley, Senior Mechanical Engineer of the Hope Natural Gas Company.

Professor W. E. Nightingale of Northwestern University, then discussed "Cooperative Training of Technical Men."

The Monday afternoon session was allotted to the Chemical Committee under the Chairmanship of E. L. Sweeney of Boston. It included the following papers: "Determination and Examination of Light Oil in Gas," by William L. Glowacki, Mellon Institute, Pittsburgh, Pa.; "Changes in Composition of Manufactured Gas in Contact with Soil," by J. F. Anthes, The Brooklyn Union Gas Co., and "How Recent Developments of Water Conditioning Technique Are Combating Industrial Water Problems," by Dr. R. E. Hall, Director, Hall Laboratories, Inc., Pittsburgh, Pa.

On Tuesday morning there were three papers: "Some Thoughts on



Left to right (seated):—M. P. Novak, Joliet, Ill.: K. Fuery, A.G.A. Headquarters; L. E. Knowlton, Chairman, Gas Production Committee, Providence: R. H. Arndt, Vice Chairman, Gas Production Committee, Baltimore; H. M. Blain, New Orleans.

Left to right (standing):—Louis Drogin, Portland, Me.; A. C. Sedlachek, Philadelphia; F. J. Pfluke, Rochester, N. Y.; B. P. Mulcahy, Chairman, Subcommittee on Carbonization and Coke, Indianapolis; T. J. Shanley, A.G.A. Headquarters; Samuel Green, The Brooklyn Union Gas Co.; W. E. Lebo, Chairman, Subcommittee on Water Gas; J. M. Beall, A.G.A. Headquarters; S. J. Beale, Chairman, Builders' Section, West Gas Improvement Co.; W. K. Beard, The Philadelphia Gas Works Co.

ON THE RIGHT:

Left to right: (front row—seated)—R. E. Kruger, Chairman, Gas Conditioning Committee, Rochester, N. Y.; Gladys Hanshaw, A.G.A. Headquarters; H. L. Gaidry, Vice Chairman, Technical Section, New Orleans, La.: D. P. Hartson, Chairman, Technical Section, Pittsburgh, Pa.; John H. Wolfe, Baltimore, Md.; E. L. Sweeney, Chairman, Chemical Committee, Everett, Mass.

(front row—standing)—L. W. Tuttle, Chairman, Distribution Committee, Oak Park, Ill.; J. M. Beall, A.G.A. Headquarters; W. Philpot, Toronto; Dr. A. R. Powell, Koppers Co., Pittsburgh; S. P. Cobb, Ebasco Services, Inc., New York; H. M. Blain, New Orleans, La.: R. J. Sheridan, Vice Chairman, Chemical Committee, Brooklyn Union Gas Co.

(back row—standing)—H. D. Lehman, Vice Chairman, The Philadelphia Gas Works Co.; R. G. Griswold, Electric Advisers, Inc., New York; L. E. Knowlton, Chairman, Gas Production Committee, Providence; S. J. Beale, Chairman, Builders' Section, New York; J. V. G. Postles, Philadelphia; C. S. Goldsmith, Vice Chairman, Distribution Committee, Bklyn, N. Y.; W. J. Murdock, Joliet, Ill. V. J. Altieri, Chairman, Subcommittee on New Developments, Everett, Mass. *Photos A. Gordon King*

the Economic Position of the Manufactured Gas Industry," by R. A. Sherman, Battelle Memorial Institute, Columbus, O., "Investigations Concerning the Pressures Developed During the Carbonization of Coal," by Drs. Walter Fuchs, A. W. Gauger, A. G. Sandhoff, and J. A. Taylor, The Pennsylvania State College, State College, Pa., and "Two Years Experience with Reversed Flow Machines at Portland, Maine," prepared by George R. Steere, Seattle Gas Co., Seattle, Wash., and read by Mr. Louis Drogin, Chemist, Portland Gas Light Co., Portland, Maine.

Tuesday afternoon was taken up by three luncheon conferences respectively on "Coal Carbonization and By-Products," "Water Gas Operation," and "Chemistry in the Gas Industry."

On Wednesday five papers were presented as follows: "The Use of Ammonia in a Thylox Liquid Purification System," by Linn B. Bowman, Rochester Gas & Elec. Corp., Rochester, N. Y.; "Maintaining Gas Manufacturing Plants for Peak Load and Emergency Use in a City Using Natural Gas," by Lt. Col. G. T. Bentley, Michigan Consolidated Gas Co., Detroit, Mich. (Read by L. G. Kreuz, Michigan Consolidated Gas Co., Detroit, Mich.); "Coal for By-Product Coking," by J. D. Doherty, The Koppers Coal Co., Pittsburgh, Pa.; "Combustion Characteristics of Coke," by M. A. Mayers, Carnegie Institute of Technology, Pittsburgh, Pa. and "Developments in Foundry Coke and Foundry Coke Practice," by D. J. Reese, The International Nickel Co., Inc., New York, N. Y.

Alfred E. Forstall, Montclair, N. J.
One of the older gas engineers attending the conference.

A Luncheon Forum on National Defense, at which there was discussion of many phases of this subject so vital to the gas industry, was well attended and aroused very great interest.

Welding and Cutting. A new 12-page, illustrated booklet, "What the Purchasing Agent Should Know About Oxy-Acetylene Welding and Cutting Equipment and Processes," has been issued by The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation. The booklet is designed to help the user or prospective user obtain a clear understanding of the oxy-acetylene process and the various construction and operating features of welding and cutting apparatus used in applications of the process. It contains a guide to the selection of the proper type of equipment, with a check list of important points to consider in selecting welding and cutting blowpipes, cutting machines, regulators, and acetylene generators. Also included is a listing of some of the modern applications of the oxy-acetylene flame, suggesting the many uses to which it may be put.

Copies of this booklet, Form 4694, available at the nearest office of The Linde Air Products Company or the General Office at 30 East 42nd Street, New York, N. Y.

Also a booklet, "Opportunities for Profits With Portable Machine Cutting," describes the many advantages of oxy-acetylene cutting with portable machines, the diversity of operations which can be performed, and a variety of applications. Several new profitable "hints and kinks" on the use of these machines have been added.

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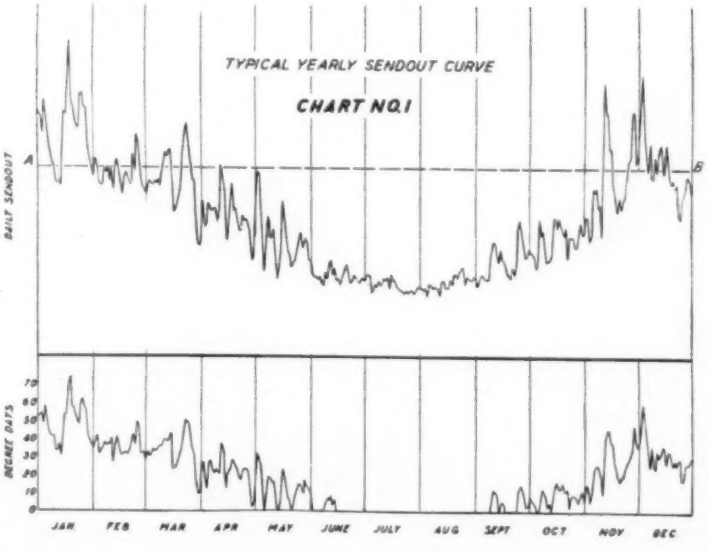
FLAMDICATOR

For Determining Combustion Characteristics of Fuels and Gases

By

M. G. Markle

Public Service Company
of Northern Illinois
Oak Park, Illinois



THIS paper covers some developments in equipment for determining the comparative combustion characteristics of various fuel gases, and the application of this equipment to gas systems distributing mixed gases.

The daily sendout on a system having a fair percentage of space heat load varies during the year somewhat as shown on Chart 1, the demand on a summer day being a relatively small proportion of that required on a cold winter day. The area on this chart below the broken line A-B represents the portion of the demand that may be supplied by a base load gas. Very often this supply is limited to a definite amount for any one day, requiring, on peak days, the addition of some type of manufactured gas.

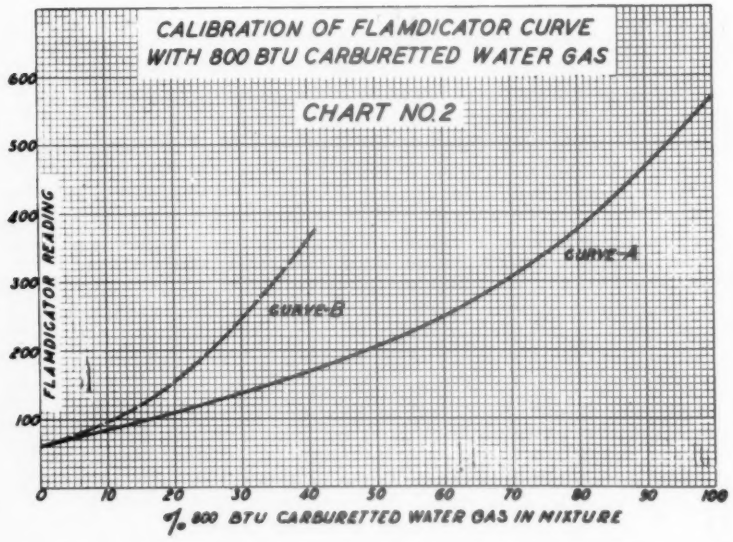
The combustion characteristics of a peak load gas are normally different from those of a base load gas. Since only base load gas is distributed during the greater portion of the year, appliances on the mains are necessarily adjusted to that gas, its particular combustion characteristics setting the standard of adjustment. Therefore, when a peak load gas is mixed with the base load gas it results in a different performance, varying with the increased percentage of peak load gas in the sendout mixture. Anyone involved in operating conditions of this nature soon realizes that the customary practice of judging combustion characteristics of a gas mixture from the heating value and specific gravity alone is misleading. It soon becomes evident to him that combustion characteristics are dependent not only on the B.t.u. and gravity but on the chemical composition of the mixture.

To cite an example of all this, let me take the case of a system of approximately 50,000 customers who are somewhat above the average as gas users, exemplified by the fact that the territory is at the present time about 11% saturated with gas space heat. Normally these customers are served with an 800 B.t.u. .55 gravity mixed natural base load gas. During peak periods this base load gas is augmented with an 800 B.t.u. carburetted water gas. Test observations taken on a set of representative burners indicated a difference in the combustion characteristics of the peak load and base load gases, and brought out the desirability of finding some device that would indicate to us at the station the character of appliance performance in the field so that we could supply some means of regulating the sendout mixtures and maintain that performance within the satisfactory range. Simply stated we needed an instrument that would automatically indicate the changes in combustion characteristics of our sendout gas mixture.

Investigation soon proved that something more than a recording calorimeter and a specific gravity recorder was necessary to give us the indication we needed. After much experimentation with numerous ideas we conceived the theory that possibly burner temperatures were somehow related to the combustion characteristics of different mixtures of our peak and base load gases. Following this clue we took the temperatures at the tip of a Bunsen burner with various mixtures of these two gases applied to it. The results proved our theory to be correct, in that these temperatures plotted against the mixtures resulted in a smooth, well-defined curve.

From the discovery of this fundamental fact the "Flamdicator" was developed. (Fig. 1) It consists of a 10.2 millimeter Bunsen burner with an air adjustment that can be locked in place, and a stainless steel tip separated and insulated from the base of the burner by an asbestos tube. A thermocouple is attached to the tip just below the edge exposed to the flame, and the cold junction thermocouple is placed directly within the gas air stream, connected such that the E.M.F. of one thermocouple is opposed to the other. I want to point out here that the incorpora-

Presented at American Gas Association Technical Section, Eighteenth Annual Distribution Conference, Hotel William Penn, Pittsburgh, Pa., April 23, 1941.



tion of an insulating tube in the construction of the burner is to retard the loss of heat from the tip and thereby attain the range of readings wanted. Also, connecting the cold junction as we do, we record not the actual temperature at the tip, but the degree of heat absorbed by the tip due only to the burning of the gas air mixture.

In actual operation the "Flamdicator" is set up as shown in Fig. 2. The burner is fixed within a transite jar constructed so as to allow for free passage of primary and secondary air through a false bottom. The supply of gas is regulated to two inches water pressure by a sensitive inches to inches regulator with an incline gauge connected to its outlet as a ready means of checking the operating pressure. We used a Leeds-Northrup Micromax as an indicator-recorder principally because of the large indicating dial available on this type of instrument. To broaden the scale and make the readings more discernable we had it equipped with an eight microvolt suppressed zero scale.

As I have indicated previously our primary interest was in mixtures of carburetted water gas with base load gas. The "Flamdicator" was therefore calibrated with various mixtures of these gases and a curve was drawn (Chart 2) with Flamdicator readings plotted against percentages of carburetted gas in the mixture. Those familiar with the production of carburetted water gas will realize that this is not a true calibration of the instrument because of the variations in the quality of a gas produced from day to day. However, the real purpose of this calibration, if we may call it such, was to see that the instrument behaved properly over the whole range, and also to furnish us with a rough idea of the amount of peak load gas in the mixtures going to the street.

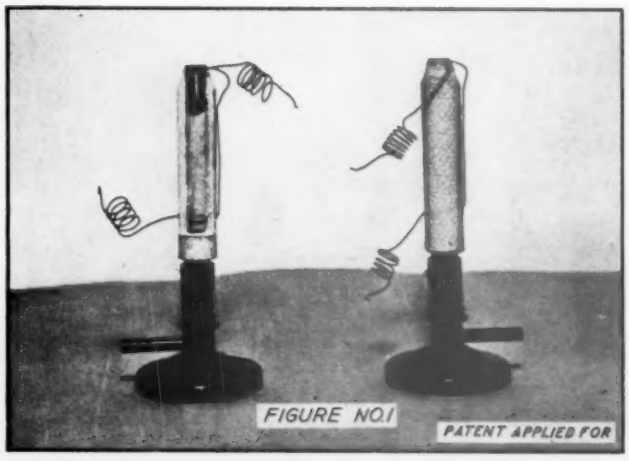
While I am referring to this curve I would like to point out the significance of the dotted curve B. We found that if mixtures were applied to this burner that would cause incomplete combustion the readings increased again along curve B as the flame became softer and finally developed a yellow tip. We have not made a complete calibration of this curve since we were concerned more with a peak load gas that tended to cause hard, sharp flames.

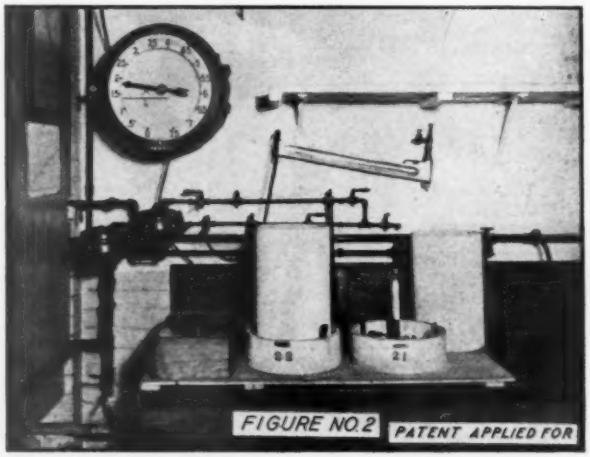
To apply this instrument to our particular operating problem it was necessary for us to correlate Flamdicator readings with actual burner performance. Peak load gas was added to the mixture in slow steps until faulty burner performance indicated a stop point had been reached. This test established the fact that any sendout mixture that maintained a Flamdicator reading of 200 or less was satisfactory for customer consumption.

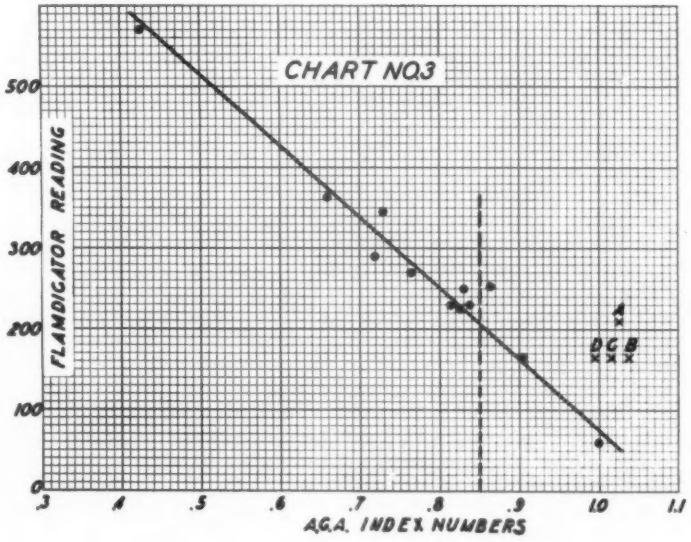
We have had occasions to check the conclusions reached from this test by actual peak load operations and have found them to be correct.

Some investigations were recently made by us toward finding a substitute gas that would allow greater peak load production. The Flamdicator was used as the index of interchangeability of the various gases produced. During the investigation we produced a gas of the same B.t.u. and gravity as our base load gas, but of different chemical composition. Both the Flamdicator and visual observation indicated that this gas had different combustion characteristics than that of our base load gas.

I have calculated the A.G.A. index numbers of various gases that have been applied to the Flamdicator in order to see what relation they might have to the readings taken on the instrument (Chart 3). The evidence would be more conclusive if I had more analyzed samples available; however, the points as plotted indicate quite definitely that there is a straight line relation between the two. You will also note that the recommended lower limit of .850 for the index number coincides surprisingly well with the maximum al-

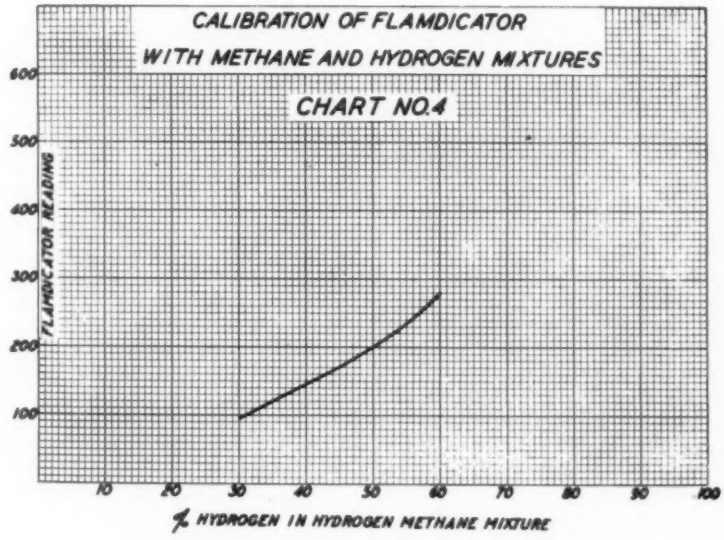






lowable reading on the Flamdicator. I would like to point out that points A, B, C and D represent gases that resulted in a high burner input. These particular samples were checked by visual inspection on a set of representative burners and were found to correspond in operating characteristics to that indicated by the Flamdicator; however, the index number calculated higher than was expected. Possibly this was due to the high input value, but I believe it was more likely due to the lack of a complete analyses of the illuminants, thereby affecting the calculated results of the A.G.A. formulae.

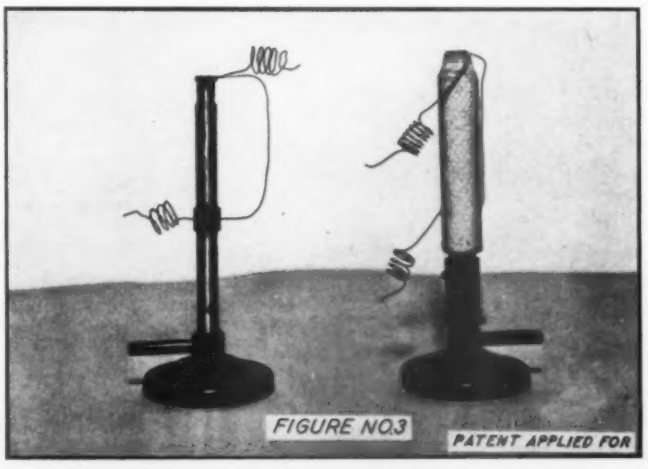
It will readily be seen that some means of easily calibrating new burners and checking old burners had to be devised. For this we used definite mixtures of methane and hydrogen. We first applied these mixtures to a burner of known performance and obtained readings corresponding to each mixture. Using these as a standard, which can be recorded in the form of a curve (Chart 4), we calibrate and adjust any new or old burner to the range of readings that we particularly desire.



Flamdicators that are in continuous use are subject to dust and lint in the air and gas inlets, and possibly to other changes of a permanent nature such as corroded thermocouple contacts. If an old burner does not return to its original range of performance after it has been thoroughly cleaned, it is assumed that such a change has taken place. To correct this possibility each Flamdicator is equipped with an adjustment by which we raise or lower the whole range of readings to within the limits desired. It is evident that by the same means we can accurately match all burners, old or new, so that all of our Flamdicators will indicate the same reading for any one gas mixture.

While this paper was being prepared a new burner was in the final stages of development (Fig. 3) and will soon replace the one that I have described in this paper. The principle is the same but we have simplified the construction. We have accomplished the same results that we did with the insulating sleeve by using a metal of low heat conductivity for the burner tube and removing some of the metal near the tip.

We still have some work to do towards simplifying the method and equipment used for checking purposes, and we also hope to find the answer to the whys and wherefores of this burner. So far we do not have a complete answer as to why it should react to flame conditions as it does. We have, however, observed at times certain unusual reactions that lead us to believe that possibly now we have the clues necessary to direct an investigation that will eventually solve this problem.



Natural Gas Convention

(Continued from page 14)

There followed a symposium on "Executive Responsibility in Organization and Domestic Sales Promotional Methods in a Metropolitan Company," by J. French Robinson, vice-chairman, Natural Gas Section, A. G. A. and president, The East Ohio Gas Company, Cleveland. Mr. Robinson was followed by E. J. Stern, vice-president, Public Utilities Corp., Atlanta, who devoted his presentation to sales promotion in urban service areas.

Following this the sound movie in color, "Fun in the Kitchen," was presented through the courtesy of the Pacific Coast Gas Association.

Cavalcade of Gas

As part of the Residential Gas Sales Conference, the meeting on the morning of May 6th at the Baker Hotel—"Cavalcade of Gas," was presided over by Floyd M. Rosenkrans, New Business Manager of the Gas Service Company of Kansas City, who acted as chairman with E. C. Sorby, Sales Promotion Director of Geo. D. Roper Corporation, as Master of Ceremonies.

Mr. Sorby opened the program with a presentation of "Master Craftsmen," whom he introduced as C. C. Young and Earl Brown of the Dallas Gas Company. The part of "Father Time" was taken by E. C. Watkins also of the Dallas Gas Company.

Mr. Rosenkrans delivered an address on the "History and Development of Natural Gas," followed by Lloyd C. Ginn, Advertising Manager of American Stove Company, whose theme was "The Old Salesman."

Home service was represented at this meeting by Jewel Hensley, Home Service Director of the Gas Service Company of Topeka and Adelle Morgenson, Home Service Director of the same company at Bartlesville, Okla. The theme of their talk was, "The Way to a Man's Heart."

Organized by J. H. Warden, Sales Manager, Natural Gas Company of Tulsa, there followed a presentation entitled, "Hot Acquacade," the characters being "Miss Gaye Nyntees" and "Miss Moderne Aqua Belle."

Organized by the House Heating Committee of A. G. A., J. G. Tooker, New Business Manager of the Gas Service Company of Wichita, Kans., presented, "A Gas Heating Problem."

"Gas Refrigeration," was the subject presented by R. J. Canniff, Sales Promotion Manager of Servel, Inc.

This was followed by a Grand Finale with several interesting stage settings.

Accounting Conference

Presiding at the morning meeting was R. E. Hull, chairman, Southwest Regional Accounting Committee.

Following his opening remarks, E. N. Keller, chairman, Accounting Section, Philadelphia Electric Co., spoke on "Cooperative Work Pays Dividends."

Ladies who participated in the "Parade of Results" at the "Cavalcade of Gas" session held at the Baker Hotel on May 6th under the Chairmanship of F. M. Rosenkrans with E. C. Sorby as Master of Ceremonies.

From "Way Down Under"
come the highest grade of selected lambskins.

New Zealand Skins **are noted for their small pores and fine texture. Those we treat conform to definite standards of thickness and absence of holes, scratches or blemishes.**

These we use in the manufacture of

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RECHROME METER LEATHER

a product which has been recognized with universal acceptance by the Gas Industry for over 50 years.

Our leathers stand up in the meter under all variable conditions. They are strong, pliable and unaffected by heat, cold or dampness.

Superior to any substitute offered for this purpose.

We also manufacture Oiled Meter Leather for Iron and Tin Case Meters, Governors and Regulators.

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"Original Cost Determination," was given by E. A. Steinberger, Lone Star Gas Company, Dallas, and "Accounting in Taxation," by I. M. Avent, United Gas Pipe Line Co., Shreveport, closed the morning program.

The afternoon meeting was presided over by L. L. Dyer, vice-chairman, Accounting Section, and comptroller, Lone Star Gas Co., Dallas, who gave an address on "The Increasing Importance of Accounting," followed by discussion on related subjects.

Accident Prevention Conference

Presided over by W. H. Adams, chairman of the Accident Prevention Sub-Committee, Natural Gas Section, this opened with a panel discussion, "How to Instill and Maintain a Greater Interest in Accident Prevention," entered into by James R. D. Eddy, director, Department of Vocational Education, Austin, Texas; C. E. Bennett, president, the Manufacturers Light & Heat Co., Pittsburgh; Ralph Shipp, chief engineer, The Lone Star Gas Co., Petrolia, Tex.; Floyd Callison, Oklahoma Natural Gas Co., Okmulgee, Okla., and Hon. J. P. Gibbs, Casualty Insurance Commissioner, Austin.

To close this session, G. M. Kintz, district engineer, United States Bureau of Mines, Dallas, spoke on "Fires and Causes of Explosions in the Gas Industry and Some Means of Extinguishing and Prevention."

"The Right Man in the Right Place," was presented by W. R. Davis, assistant personnel manager, Southern California Gas Co., Los Angeles, followed by a paper by A. P. Kitchin, special agent, Federal Bureau of Investigation, "Protection of Utility Property Against Sabotage," which was read by E. C. Wenig of the Dallas office of F. B. I.

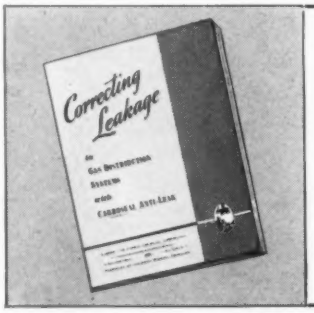
Proof that "Carboseal" Anti-Leak Works

...provides long-term, low-cost correction of leakage in Dry Bell-and-Spigot Joints

THE results tabulated at the right are typical of general field experience. They show why more than 265 gas properties are now using "Carboseal" anti-leak to correct packed bell-and-spigot joint leakage in systems distributing dry gas.

Joints treated with this scientifically developed liquid are tight and stay tight indefinitely. Joints treated eight years ago are still tight today on the soap test . . . And the cost is unbelievably low! The experience of 16 users who treated over 200 miles of main indicates that the average cost is about 50 cents per joint.

Diameter of Main—Inches	*Length of Main—Feet*	*Leakage Reduction—Per Cent*
8	620	100
4 and 6	404	72
4	273	60
6	582	95
6	92	100
4 and 6	257	85
4	1,200	100
3	637	63
6	1,600	86.2
3	606	95.3
3	618	100
4	303	95.5
8	713	85.5
4	1,700	91



It will pay you to investigate

You too can do what others have already accomplished with "Carboseal" anti-leak treatment. Plan now to start using this accepted method for reducing *your* unaccounted-for gas loss . . . This 20-page book tells more about "Carboseal" anti-leak treatment—how it can be applied by either the gravity or the hose method, how much it costs, and what results can be obtained. Write for a copy today, without obligation.

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RECENT COURT DECISIONS
Affecting Gas Utilities

Review of New and Modern Gas Law

By
Leo T. Parker
Attorney at Law,
Cincinnati, Ohio

SELDOM have recent higher courts rendered several unusually important decisions within a short space of time. However, during the past few months there have been decided many points of law, involving gas companies, in which all readers will be interested in knowing the details. Therefore, we shall review these cases.

First, it is important to observe that the modern courts recognize the fact that selling and distributing gas is a business having particular interest to the general public, and that the important consideration is: The public has a legal right, under ordinary circumstances, as where no valid contracts are violated, to purchase gas at the lowest possible price. For this reason the modern courts are in accord with the legal principle that the element of cost of production and distribution of gas is not so important as the ability of one or another company to serve the consumers at relatively low rates.

Therefore, an offer to sell gas at a low price, coupled with the ability to fulfill the contract, is an important element for consideration of a court in determining whether a permit should be issued to a new applicant which intends competing with a gas corporation now in the same field. Furthermore, if the new applicant offers to sell gas at a lower price, the chance of obtaining a permit is greater than where the price is the same or higher than the price now charged by the company old in the particular field. Notwithstanding the fact that the older courts held otherwise, this is the modern law.

First, we shall review in detail the late case of Public v. Arkansas Louisiana Gas Company, 142 S.W. (2d) 213. Briefly the facts are that a gas company had served consumers for many years and a new gas company applied for a permit to enter the same field and sell gas at a cheaper rate. In order that readers may realize the difference of opinions in this case, first, the Federal Commission granted the permit; second, the case was appealed and the lower court reversed the Commission and refused to grant the permit; third, the case was appealed and the higher court reversed the lower court and granted the permit.

In detail the facts are that in 1939 the Louisiana Nevada Transit Company filed with the Public Utilities Commission an application for a certificate of convenience and necessity to construct, maintain and operate a natural gas pipe line in northern Louisiana to the Ideal Cement Company at Okay, Arkansas, a distance of about 75 miles. The basis of the application was a contract with the Ideal Cement Company to supply it with natural gas for the manufacture of cement. Later the Louisiana Company amended its application so as to be permitted to construct a branch from its proposed line to Hope, Arkansas, so as to serve the Municipal Water and Light Plant and the Hope Brick Works, with whom it had contracted to furnish gas at ten cents per 1000 cu. ft. It also offered to serve the towns of Bradley, Fulton, McNabe and Saratoga, on or near its proposed line, at 45 cents per 1000 cu. ft.

On July 18, 1939, the Federal Power Commission granted to the Louisiana Company a limited certificate of convenience and necessity to construct the gas pipe line from the Louisiana field to Okay and to Hope, Arkansas, over the protest and objections of appellee, Arkansas Louisiana Gas Company.

On July 28, 1939, the Arkansas Louisiana Gas Company filed a petition in which it alleged that it was a Delaware corporation doing business in the states of Arkansas, Louisiana and Texas, with its principal operating office at Shreveport, Louisiana; that it owns and operates an integrated natural gas system, producing, transporting and distributing natural gas through a pipe line system of more than 1,500 miles of main line; that it serves 62 communities with approximately 44,000 customers in Arkansas, 23 communities with 28,000 customers in Louisiana and 18 communities with approximately 8,000 customers in Texas; that it also serves some industrial customers in said states from its main transmission line; that in 1938, it sold a total of 38,358,385 MCF of gas, of which 22,394,939 MCF were sold in Arkansas; and its total system revenue for the same period was approximately $8,150,000 of which $4,856,000 came from Arkansas business. It further alleged that the construction of the Louisiana company's line was not a matter of public convenience and necessity and that the public interest would be adversely affected if the application were granted.

After carefully considering all testimony the lower court reversed the order of the Public Utilities Commission and refused to grant the permit to the Louisiana company. However, it is important to know that the higher court reversed the lower court and held that the Louisiana company could legally install its service for cheap gas. This higher court stated the following important law:

"It is contended, and we think correctly, that since there is no claim by appellee (Arkansas Louisiana Gas Company) that the order of the Department complained of violated any of its constitutional rights, the review of such order 'shall not extend further than to determine whether the Department has regularly pursued its authority.' But this does not mean that the courts cannot inquire beyond mere formality. . . . The proceedings before the Department might be regular in all respects, and still its order might be illegal and void as being arbitrary, unreasonable, without any substantial evidence to support it, or in fraud or corruption. . . . In other words, if the Public Utilities Commission order is supported by substantial evidence, free from fraud, and not arbitrary it is the duty of the courts to

permit it to stand, even though they might disagree with the wisdom of the order.

"Another important point of law involved in this case was whether the Louisiana Company had filed with the Department a certified copy of its articles of incorporation; copies of the contracts it has made with the three industrial consumers it proposes to serve; and has satisfied the Department of its financial responsibility and managerial ability, of the abundance and quality of its supply of natural gas. The City of Hope is, naturally, very much interested in the prospect of cheaper gas rates for its Municipal Light and Water Plant, as also the Hope Brick Works. Then there is the fact of the offer to serve the three industrial consumers at a rate of ten cents per MCF.

The average rate now charged the municipal plant in Hope by appellee is 15.30 per MCF and the new rate will effect a savings of more than $6,000 per year, which may be passed back to its consumers of water and power as dividends in the form of reduced rates. The average rate paid by the Hope Brick Works over a period of several years is 17.35 per MCF and it is estimated its savings will exceed $10,000 per year. The average rates for these three consumers for 1938 were: Ideal Sement Company, 14.2582c, Hope Light and Water Plant 16.6812c, and the Hope Brick Works 15.9808c. When we consider these and other facts in the records, we cannot say the Department abused the wide discretion given it or that its order was arbitrary and without evidence to support it."

It must not be overlooked that the legal effect of state and federal laws, and also contract relationship, must be considered. However, the fact is that a majority, if not all of these laws, authorize the Public Utilities Commission, or other department, to regulate the service and rates of utilities under its jurisdiction. Before engaging in the utility business or beginning any new construction, or extension therefor, an application must be made for a certificate that the "public convenience and necessity require, or will require such construction or operation." And, as indicated by the above higher court case, modern courts importantly consider the desirability of cheap gas when deciding whether a permit shall be granted.

Validity of Municipal Contracts

Various higher courts have held that two fundamental principles of law, applicable to municipalities are: Municipalities possess no power except that expressly conferred by state laws, or that which is necessarily implied in order to carry out the expressly conferred authority; and charters of municipal corporations occupy the same relation to the municipality as does a constitution to a state.

Other higher courts have consistently held that a municipality is a creature of the Legislature and it can only exercise (1) the powers granted by state laws in express terms; (2) those necessarily or fairly implied or incident to the powers expressly granted; and (3) those essential to the accomplishment of the declared objects of the corporation.

However, a contract made by properly authorized municipal officials may be valid and binding and the city will be held liable in damages for failure to fulfill the obligations assumed in the contract providing, of course, the contract is valid.

The courts have consistently held that a municipal contract is valid if the obligations of both contracting parties are definitely fixed; the object of the contract is legal; both contracting parties have proper authority to make the contract; the duration of contract is clearly specified; the quantity and quality of material is clearly indicated; the parties are mutually obligated to perform one or more acts; and the contract is not in violation to a state or city law.

For illustration, in Laharpe Company v. City of Iola, 105 Pac. (2d) 900, reported October, 1940, it was disclosed that in 1932 a gas company and a municipality entered into a written agreement under which the gas company agreed to sell and the city agreed to purchase fifty million cubic feet of natural gas per year at the price of twenty-five cents per thousand cubic feet. The contract was to remain in force for five years, or to March, 1937.

The contract provided that it was understood that the city has already contracted with the Oklahoma Natural Gas Corporation for the purchase of a minimum of One Hundred Ten Million cubic feet of natural gas per year with a minimum during the months of May, June, July, August, and September of One Hundred twenty-five thousand cubic feet per day, and that "should the requirements of the city not equal the said fifty million cubic feet per year, over and above the minimum requirements of the Oklahoma Natural Gas Corporation contract, then the amount to be purchased under this contract shall be reduced accordingly."

After expiration of the contract the gas company sued the city for damages on the contention that in several months during this five-year period the city had not taken the amount of gas specified in the contract.

The counsel for the gas company alleged that during the term of the contract it maintained a sufficient supply of gas to comply with all of the requirements of the contract, and that it was entitled to damages in an amount equal to the selling price of 25 cents per 1000 cu. ft.

The counsel for the city contended that the contract sued on was void for the reason that the record fails to show a certificate of convenience was issued to the gas company; that it had delayed in filing the suit; and that the amount of damages could not be based upon 25 cents per 1000 cu. ft. of gas because this was the full price which the city would have paid for the gas had it complied with the contract. Notwithstanding these contentions the higher court held the city liable, saying:

"The court made no findings as to whether the plaintiff (gas company) had or did not have such certificate, or whether it was a corporation required by law to have such certificate. . . . It is contended that the claim against the city was not in proper form, and that the delay in filing such claim promptly constituted such inexcusable delay or laches as to estop claiming damages in this action. We had no merit in these contentions. . . . The court finds that as there was and has been no market for said gas that the damages sustained by the plaintiff (gas company) on account of the failure of the defendant (city) to take said gas as provided in the contract, is the sum of 25 cents per thousand cubic feet; that its damage is in the total sum of $6,190.75."

Law of Ambiguous Contracts

The higher courts in all states agree that a restriction, variation, or modification in a contract is valid and enforceable. Also, both the purchaser and seller are bound by the terms of a guarantee, providing when the contract was made both *intended* to be bound by the guarantee.

It is well to realize that a seller is not liable for fraud or misrepresentation where he merely states his own opinion regarding the quality of merchandise. And conversely a recent higher court held a seller liable to a purchaser for fraud where it was shown that the former purposely remained *silent* about certain defects of the merchandise, thus deceiving the purchaser. This court said:

"A seller may not do anything to conceal from the other a material fact, or say or do anything to divert or forestall an inquiry by him or deliberately hide defects or other facts, for in so doing he is not merely remaining silent, but is taking active steps to mislead." (See 134 Atl. 62.)

Frequently litigations involving contracts for sale of gas require con-

(Concluded on page 53)

New Equipment

Bellmaster Pipe Joint

Developed in answer to a need for a simpler, easier-to-install mechanical joint that will last as long as the cast-iron pipe on which it is used, the new Dresser Bellmaster Joint, Style 85, possesses a number of installation advantages and construction features not found in other types of joints.

The Bellmaster Joint is a single-gasketed, self-contained mechanical joint that is strong, flexible, corrosion-proof. It consists of a few simple parts—Inner Ring, Armored Gasket, Outer Ring, a set of Capscrews—all factory assembled into a single unit. To install, the Bellmaster is simply inserted in the bell end of pipe prepared to accommodate the Joint, locked in place by twisting slightly clockwise, spigot end "stabbed in," and capscrews tightened. Working principle is simple and effective: as you tighten the capscrews, the inner ring is drawn closer to the locked outer ring, thus expanding the gasket against the outside of the spigot and against the inside of the bell, making a tight seal against both.

Dresser Bellmaster Joint

Time studies in all sorts of weather and ditch conditions prove that an ordinary workman can install a Bellmaster Joint in from 2 to 5 minutes. All that is needed is a small ratchet wrench. No other tools required.

This "floating joint," with its large-section resilient gasket, allows deflection in any direction, as well as longitudinal movement caused by expansion and contraction. Its unusual deflective properties permit connecting pipe over a ditch and "snaking" it in even when rounding a curve. In the smaller sizes, it can be deflected through an arc of as much as 18° without impairing its tightness or efficiency.

The Bellmaster is completely enclosed by the bell of the pipe in which it is inserted. There are no exposed parts or outside lugs. Possibility of capscrews in Joints being broken due to settlement of line is eliminated because capscrews, as well as entire Joint, are independent of the bell or spigot; stresses in screws remain constant regardless of degree of deflection in Joint.

The Style 85 Bellmaster is at present available in the following CIP sizes—4", 6", 8", 10", 12", and 16". Other sizes will be available soon.

Small Capacity Regulator

Shown below is the EMCO Appliance Regulator No. 094-02, of the Pittsburgh Equitable Meter Company of Pittsburgh, Pa., designed

Emco Regulator

primarily "to provide accurate pressure control on gas refrigerators, pilot lights for gas and oil burners, governing controls, small gas appliances and other equipment having a low gas consumption."

Fluctuating line pressures, which cause pilot flames to raise and lower with resulting unreliable and inefficient functioning, are held constant and the flame can be set and maintained at the proper height for most efficient and economical operation, according to the makers, by installing this regulator. When used on gas refrigerators and small appliances, a controlled heat input is assured regardless of changes in the supply pressure.

In this new regulator, safety of operation and simplicity of design were given primary consideration. The body and cover are aluminum die cast, resistant against corrosion.

Bulletin 1067, giving complete description and specifications, is available on request to the manufacturer at 400 N. Lexington Ave., Pittsburgh.

Airtemp Boiler

A new gas fired design based on the percolator principle is offered by the Airtemp Division of the Chrysler Corporation, Dayton, Ohio.

Two fins of special design are cast into each boiler section so as to provide an inverted cone immediately above the crown sheet to increase the speed of water circulation.

The rapidly ascending steam and hot water sets up a fast circulation of water throughout the entire boiler. This means increased rapidity of heat transfer from the combustion chamber to the water.

It is claimed that heat is produced more rapidly in the radiators after the thermostat turns on the flame. From a cold start, it is stated that radiant heat in the rooms is produced in ten minutes and that the boiler is 30% smaller than other boilers of the same performance. A further claim is a marked fuel saving—the result of transferring more of the heat from the flame to the surrounding water.

As the steam and hot water move

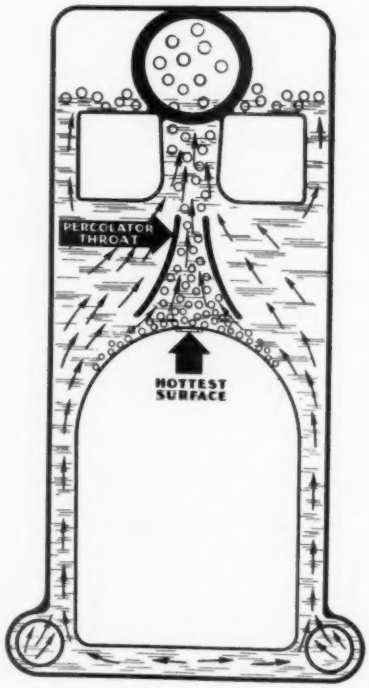


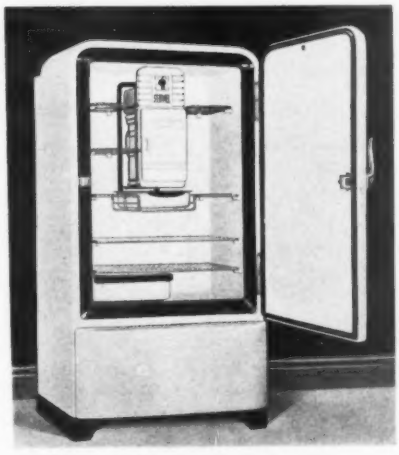
Diagram shows how steam bubbles formed directly over fire rush upward through percolator throat of new Airtemp percolator boiler causing high-speed water circulation. Boiler has wet base.

and Appliances

to the rear of the boiler, a steam separator causes centrifugal force to throw the water to the sides to assure dry steam in the pipes. The unit has a wet base, the entire combustion chamber being surrounded by water. An additional optional feature is a tankless heater which provides domestic hot water throughout the year with a capacity of three gallons per minute. The gas fired type boiler is available in four capacities—3, 4, 5 and 6 sections.

New 6 Cu. Ft. Servel

The new low-price six-cubic-foot Servel Electrolux refrigerator which has just been released to gas companies throughout the country has been designed with an eye to serving the moderate income family with its need for the popular sized model.



The symmetry of its exterior, finished in glistening white Newtone enamel, will enhance the appearance of any modern kitchen. The door is opened by a double action handle.

Twelve square feet of shelf area is provided for food storage. Ample room for keeping various sized bottles or containers is provided in the shelves adjoining the freezing unit.

Two ice cube trays and a frozen dessert or ice cream tray, which can also be used for making ice cubes, assure a constant supply of ice. Under the freezing unit is a porcelain tray for the storage of meats. A second large porcelain container is also provided for vegetables.

A handy thermostat and manual defroster is situated right over the freezing unit.

Removable Back Head for Wet Test Meters

A removable back head has been designed by American Meter Company for its wet test meters, in order to facilitate cleaning and easier access to the drum. When specified, any of the "American" A1-18 series of wet test meters for

Removable Back Head

general laboratory testing and for calorimetry—including both the low pressure and the new high pressure models—now may be equipped with this new helpful device.

Its use is especially convenient where gas conditions make periodical washings advisable. Firsthand inspection also is greatly simplified, so that corrosion and other effects may be observed more readily and the need for repairs lessened.

The improved back head assembly may be attached not only to new models but also to meters (with either flat or convex back heads) already in service. Full description is given in the newly-revised "American" Catalog AG-3 on Wet and Dry Test Meters. For a copy address American Meter Company, 60 East 42nd Street, New York City, or the office of that company nearest you.

Butterfly Valve for Air, Gas, Steam and Liquids

Illustrated is a hand-wheel operated design of the improved butterfly valve in which internal parts are machined to assist operation and to obtain a tight fit between housing and vane. The line includes a standard range of sizes from 2 to 48 inches for working pressures up to fifteen pounds.

A feature in the design lies in the pair of adjustable stops which are provided to stop the vane in either of two set positions between "open"

and "closed." This permits constant duplication of any set maximum or minimum opening, in addition to full-open and tight-closed positions. All valves have a graduated dial and pointer for the exterior determination of the butterfly vane.

The hand-wheel assembly operates through a self-locking worm and quadrant and is arranged on the side of the housing so the wheel can be located in the most convenient position. Wheels, worm and quadrant can be omitted and a lever connected directly to the butterfly vane shaft for hand-lever operation. Literature from R-S Products Corp., 4530 Germantown Ave., Philadelphia, Pa.

Dust Filter

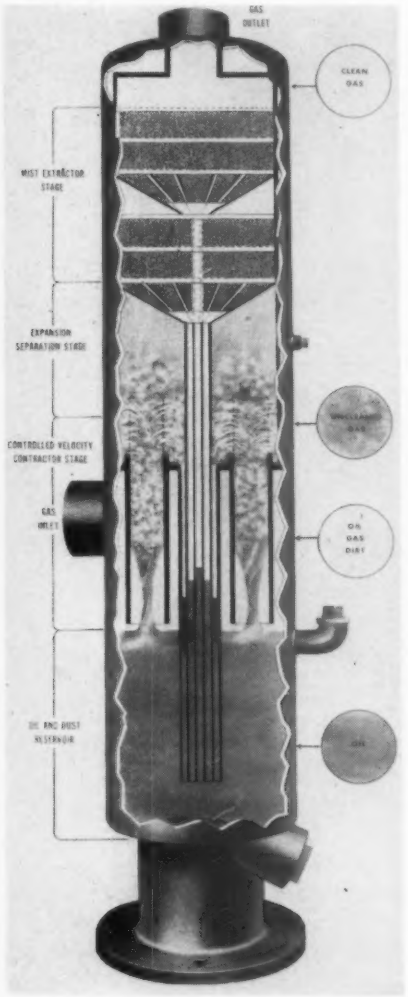
For removing dust from large volumes of gas on distribution lines and in industrial service, Reliance Regulator Corporation, Alhambra, California, announces the new Type "C" Dust Filter. It is equipped with nine filtering elements that are easily accessible for cleaning or replacement. Made in two sizes,

1½" and 2" pipe connections. It is claimed that these Filters operate effectively with low pressure loss and within a wide range of capacities depending on the pressure differentials. Designed for inlet pressures to 150 lbs. p.s.i. Complete information available on request.

New Equipment and Appliances

Blaw-Knox Cleaner K-6L

Blaw-Knox Company has developed a number of new gas cleaners in the type "K" series. These are of the low capacity or consumer type suitable for installation in front of a commercial or industrial customer's meter, or to do



Blaw-Knox Cleaner

the gas conditioning for an entire district or at a town border station. One of the series, the "K-6L," which will condition 396,000 cubic feet per day at 30 pounds gauge pressure, costs only $95.00; and the prices for the other units in the series are proportionately reduced.

The new series of gas conditioners employ the basic Blaw-Knox method of cleaning the gas. As may be noted in the illustration, one part of the device forces the utmost intimacy of contact between the gas and the washing liquid. Most of the liquid with the entrained dust particles falls out of the gas in the expansion separation stage, and drains back to the reservoir. The finer drops are removed in the mist extractor stage, where scientifically designed drainage channels allow fast run-off of liquid while forcing the gas to have a maximum contact with the separation material.

Every step in the movement of gas from the inlet of the unit to the delivery of clean gas in the outlet has been tested and checked over a considerable period of time, and the present method of gas conditioning employed in this series represents the culmination of years of development. Further information may be secured by asking for bulletin No. 1824.

"Stowaway" Gas Furnace

The Lennox Stowaway is a complete forced air type gas furnace that is made in a shape and size for installation in the attic of basementless homes. It can be set horizontally on the ceiling rafters and is small enough to go through a normal "skuttle hole" and low enough so there will be room for it in any except flat roofed homes.

The unit is highly efficent and quiet. A small and inexpensive vent pipe through the roof replaces the expensive chimney.

The short and compact combustion chamber has necessitated the development of an ingenious burner construction. Individual, vertical venturi tube burner heads, accurately mounted on a heavy cast gas manifold, provide sufficient area of slotted ports to keep the gas flames close to the burner head. Each head allows secondary air to reach both sides of the flame so combustion efficiency is unusually high.

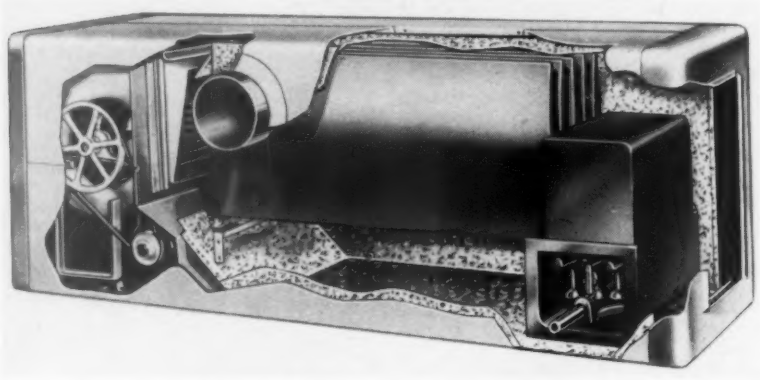
Made in 3 sizes having 75,125 and 165M Btu input. Full description of these units in bulletin G 50 issued by The Lennox Furnace Co., Marshalltown, Iowa.

Reusable Chart

An improved design in recording instrument charts made for continuous re-use has been developed by the Permochart Company, 409 Chestnut Road, Sewickley, Pa.

Made of Vinylite plastic, Permocharts can be constantly re-used, as the previous day's ink record is easily removed from its surface with a damp cloth. Suitable especially for industries such as petroleum refineries, pipeline companies, natural gasoline and gas producers, chemical companies and utilities, as they are said to reduce chart costs by 80% or more.

It is stated they will not curl, are non-flammable, and are oil, gasoline and grease resistant.



"Stowaway" Horizontal Gas Furnace

New and Modern Gas Law

(Continued from page 49)

siderable testimony. Now, therefore, in consideration of the almost endless and expensive litigation which may result from ambiguous contracts it is obvious that both buyers and sellers of gas should enter into clear and understandable *written* contracts.

Of course, if a person, firm or corporation purchases gas it is entitled to the gas and other products which may be therein at the time of delivery.

For example, in Union v. Pardue, 117 F. (2d) 225, reported February, 1941, it was disclosed that a gas corporation contracted to purchase a stipulated quantity of gas at a specified price per 1,000 cu. ft. After expiration of several months the seller sued the gas corporation to recover an additional 2 cents per 1,000 cu. ft., because the gas corporation had extracted gasoline from the gas. The seller contended that he was entitled to this additional payment of 2 cents per 1,000 cu. ft. of gas because the contract did not specifically include the gasoline therein.

However, the higher court held that a purchaser of natural gas is entitled to receive the gas, including the by-products therein. This higher court said:

"Gas means natural gas as it is taken from the earth, including any gasoline content it may have. . . . The district judge was right in holding that he could not add to the claim for that full value, another claim for two cents per 1,000 feet more, because the purchaser of the gas had extracted gasoline from it."

On the other hand, a contract may be valid by the terms of which a seller of natural gas may be entitled to receive an additional payment for gasoline, or other product, extracted therefrom. However, a contract of this nature must not merely sell gas at a stipulated price per 1000 ft. but it must contain a clause which indicates that the intentions of both parties, at the time the contract was made, was that the seller should receive additional payment.

For example, in Coyle, 144 So. 739, the court said:

"If its gasoline content is not regarded as included in the gas within the meaning of the contract, then obviously, defendant (purchaser) is not entitled to it, or any part of it. If it is so regarded, then one-eighth of it is due plaintiff (seller) by virtue of the agreement."

Book Review

Chemical Warfare: By Curt Wachtel, Consultant on Industrial Health Hazards, Founder of the Pharmacological Section of the Kaiser Wilhelm Institute, Director of the Institute of International Hygiene and Occupational Diseases. Chemical Publishing Company, Inc., Brooklyn, N. Y., 1941. 312 pages. Price $4.00.

Of all the weapons of modern war, gases aim most exclusively at the wholesale annihilation of human individuals. For this reason chemical warfare is a problem of most direct concern to the people. Citizens of free countries who are responsible for themselves desire to know and should receive all the information which is necessary to deal with this problem. On the other hand chemical warfare is a highly specialized branch of applied science; physical, chemical, physiological, tactical, technical, economic and political factors are involved. *Only a rational consideration of all issues* can lead towards a reasonable solution of the problem. This book presents this information to the reader in a form that is comprehensible not only to chemists, physicians, engineers, and military experts but also to the laymen who are the prospective individual victims of the war gases.

CHEMICAL WARFARE covers all the aspects of war gas and its ramifications. The history of the subject is covered, as are the men behind the story, the various classifications of gases according to their composition and physiological effects, tables, figures, statistics, and all other pertinent material. The author has always kept in mind the practical military application of the gases as well as protection against them.

A reading of the book leaves no doubt that the author is an authority on the subjects discussed. In a "Foreword," Fritz Haber, the German industrial genius of the last war and inventor of the "Haber Process," says: "Curt Wachtel organized the pharmacological section of the Kaiser Wilhelm Institute during the World War. He supervised all the installations necessary for testing more than three hundred toxic gases on thousands of animals and was in charge of research on gas intoxications. He was one of the first to observe the effects of war gases on men, and of the chronic intoxications and subjective experiences on those engaged in the manufacture, testing and handling of war gases."

Those interested in and connected with the defense of the United States need to understand the possibilities of gas attacks and how to be prepared to meet them. Such information is of particular importance to the officials of utility companies, since their employees must often remain on the job and be exposed to danger during an enemy attack, when others have sought safety.

The fact that gas has not thus far been used in the present war is no evidence that it will not be. "In a war that is allegedly directed against 'plutocratic' governments the weapons which destroy property are used in the first place. Only in a later stage of war . . . the people themselves will be attacked with the specific casualty weapons of war gases."

CONTENTS: The Ideas of Chemical Warfare, The Men Behind the Gas, How to Develop a New Gas, The Evaluation of Gases, Toxicity, Figures and Standards, Irritant Poisons, Arsenic Compounds, Sulfur Compounds, Cyanogen Group, Explosive Gases and Fumes, Treatment and Protection, Conclusions and Outlook, Psychological, Social and Economic Aspects.

Contracts Let For Pipe Lines To Aid Defense

Ford, Bacon & Davis, Inc., construction engineers, have been awarded contracts for the construction of two large "defense" pipe lines, one for gasoline and the other for natural gas.

The gasoline line will run from Louisiana refineries of Standard Oil Co. of New Jersey, Standard Oil of Kentucky and Shell Union Oil to Greensboro, N. C., and possibly the naval base at Norfolk.

The gas line, expected to cost $7,000,000, will comprise hookups and compressor station additions to Southern Natural Gas Co., running from the Monroe field of Louisiana into eastern Georgia and effecting distributing facilities to the steel center at Birmingham.

Arrangements are being made for construction of an oil pipe line from Portland, Me., to Montreal. Two other projects, much larger, are being negotiated. One of these is a 1,500-mile 24-inch pipe system which would connect Texas production points to New Jersey refineries. The other, of 1,600 miles, would connect Port Arthur, Tex., with New York. Still another proposal said to be receiving consideration is the expansion of facilities which are now bringing crude oil from Illinois fields to the east coast.

News of the Gas Industry

Pennsylvania Gas Association Meeting at Skytop, Pa.

The first business session of the Pennsylvania Gas Association opened at Skytop on May 13th with almost 400 delegates present from all sections of Pennsylvania. The first paper was presented by A. W. Johnston, Jr., superintendent of customer service of The Hartford Gas Company, of Hartford, Conn., who discussed "Some Thoughts on Meter Economics." In this talk he pointed out the soundness, from the standpoint of both the customer and the utility, of a definite program of adequate meter maintenance, to the end that the efficiency of these recording devices shall be kept at the highest possible level.

The use of grease for emergency shut-off of small, low-pressure mains was described in an interesting paper presented by R. C. Holcombe, of The Philadelphia Gas Works Company, of Philadelphia. Mr. Holcombe described this development through its early tests and uses and gave detailed descriptions of the equipment needed to utilize this emergency procedure.

E. J. H. Flexer, of the Allentown-Bethlehem Gas Company, in his paper "Good Customer Relations—All the Way," reported his own experiences in applying tested methods of building good will. The great strides which have been made by the industry in general in creating a better understanding between customer and company have resulted, he said, from definite programs the utilities have initiated in recent years. The importance of this work, Mr. Flexer said, cannot be over-emphasized.

One of the chief concerns of gas men —the old bugaboo, leakage—was discussed by R. D. Jones, of the Consumers Gas Company of Reading. He outlined the steady progress that has been made by the industry in handling this problem, both as to the efficiency of methods used and in the improvement in results obtained.

George E. Webber, of the Public Service Corporation of New Jersey, in presenting "Evaluation of a Training Program," discussed the elements of a complete employee training program, and assigned values to the various parts of any such activity, including the media used.

Dr. R. B. Mitchell, assistant professor of accounting at the Wharton School of the University of Pennsylvania, was the principal speaker at this session. He covered a number of the better-known trends in current financial statements, including the so-called streamline and public relations forms of annual reporting. Single purpose versus multiple purpose statements were considered by Dr. Mitchell in his presentation, as well as a trend toward the inclusion of unusual losses and gains in the income statement.

The production portion of today's session was devoted to talks by Major Alexander Forward, managing director of the American Gas Association and James E. Gheen, of New York City, the latter speaker discussing "Philosophy of Life"; and a technical discussion conducted by J. Edward Brewer, consulting chemist of Philadelphia, of recent developments in "dry-box purification" of gas.

The closing session on May 14th was devoted to customer and employee relations and new business.

W. G. Murfit, manager of district offices for the Philadelphia Gas Works Company, told about the manufacture of gas, its storage, distribution, measurement, and certain utilization, showing by charts and models how gas is produced commercially.

The gas industry, in common with all business men, is concerned about what its customers think of it and attach great importance to good service, courtesy, and efficiency. In discussing this broad subject, Louis F. Demmler, of the gas appliance promotion division of Ketchum, MacLeod & Grove, Inc., of Pittsburgh, surveyed the importance of dealer relationships involved in the distribution of gas appliances, and pointed out ways in which more constructive aid for and interest in local dealers by manufacturers were possible.

"How to Get Fat," and "Refrigeration and the Gas Utility" were the subjects discussed by Lyle C. Harvey, of the Bryant Heater Company of Cleveland, Ohio, and George S. Jones, Jr., of Servel, Inc., of Evansville, Indiana, in the closing addresses of the convention.

CONVENTION CALENDAR

June

3-5 *Annual Convention A. G. A. E. M.,* Ambassador Hotel, Los Angeles, Cal.

9-10 *Northwest Conference Pac. Coast Gas Assn.,* Portland, Ore.

30 to July 2 *Michigan Gas Assn.,* Grand Hotel, Mackinac Island.

August

18-20 *Appalachian Gas Measurement Short Course,* Morgantown, W. Va.

September

8-10 *Mid-West Gas School and Conference,* Ames, Iowa.

10-12 *Pacific Coast Gas Assn.* Annual Convention, Del Monte, Calif., Hotel Del Monte.

October

6-10 *National Safety Congress and Exposition,* Chicago, Ill.

20-24 *American Gas Assn. 25th Annual Convention,* Atlantic City, N. J.

New officers elected for 1941-1942 follow:

President, P. T. Dashiell, Philadelphia; Vice-Presidents, F. W. Lesley, York; Blackwell Newhall, Philadelphia, and E. G. Boyer, Philadelphia; Secretary, William Naile, Lebanon; Treasurer, W. G. Sterrett, Jenkintown. New members elected to the Association's council are: R. W. McClenahan, Philadelphia; H. H. Ganser, Norristown; W. G. B. Woodring, Allentown; A. C. Taylor, Reading; and E. E. Mensch, of Williamsport.

Florida-Georgia Gas Meters Association

Ted Bergman, Miami, was elected president of the Florida-Georgia Gas Meters Association, in its sixth annual convention in the Hollywood Beach Hotel, Miami, April 20-22.

C. D. Littlefield, was elected vice-president. H. Stuart Johnson of Orlando was re-elected secretary-treasurer.

Directors elected in the meeting over the week-end were J. C. Hutchison, of Tampa; W. J. Pomar of St. Augustine, filling the unexpired term of A. E. Pierce, Jr., of Key West, resigned; W. D. McVey of Eustis, filling the unexpired term of Bergman; O. F. Keune of Miami; F. L. Linzer of Savannah, Ga.; I. M. Wynn of Gainesville, Fla.; J. W. Perkerson of St. Petersburg, and W. P. Woods of West Palm Beach.

The annual banquet of the Association was held Monday night with W. F. Roberts of Standard Gas Equipment Corporation, Baltimore, Md., as principal speaker. A general outline of the program presented follows:

General Session, Monday: with J. W. Owens as Chairman the program included address by C. D. Littlefield, Pres., a word of welcome from the Mayor of Hollywood responded to by R. B. Roberts of Florida Light & Power Co.

Following the paper "What Further Cooperation" by W. F. Roberts, Pres. of Standard Gas Equipment Corp., the color-sound movie "Fun in the Kitchen" was presented.

On Tuesday, Lloyd C. Ginn of American Stove Co., gave an address "The Great American Salesman" followed by Richard G. Danner, F.B.I. on "Defense."

Residential Section papers included:—

"All Year Gas Air Conditioning," John K. Knighton, Servel, Inc.; "Volume Water Heating," M. B. Mackay, The Burkay Co.; "Gas Heating Opportunities," J. M. Fisher, Bryant Heater Co.

"Let Freedom Ring," Carl Sorby, George D. Roper Corp.; "Let's Get Down To Cold Facts," B. T. Franck, V. P. Milwaukee Gas Light Co., Chairman, A. G. A. Refrigeration Committee.

Commercial Section papers included:—

"Operation of Roadside Restaurants,"

C. Tracy Ryan, Howard Johnson Co.; "Commercial Baking," Nick Erlinger, Middleby-Marshall Co.; "Dealer Co-operation," Hank Birchall, People's Water & Gas Co.

In the Technical Section were the following:—

"Positive Displacement Meters," J. C. Diehl, American Meter Co.; "Refractories for Water Gas Machines," C. E. Bales, Ironton Fire Brick Co.

"Planning Future Plant and Distribution Systems in Florida and Georgia," W. E. Steinwedell, Pres., Gas Machinery Co.; "Operating Personnel," J. W. Motz, Atlanta Gas Light Co.; "Discussion Leakage Survey by the Vegetation Method," Milton W. Heath, Heath Tree Service, Inc.

Round table discussions featured the meetings of the Accounting Section under the chairmanship of E. R. Phillips.

Gas Measurement Committee New Bulletin

Nearly all gas utility companies and oil companies in the west have been basing natural gas measurement calculations upon the methods and tables set forth in Bulletin TS 353, the revisions being designed to shorten the calculations without seriously affecting their accuracy. The amended method will be published by the California Natural Gasoline Association. The new bulletin is now ready.

T. W. Sutherland Resigns

T. W. Sutherland, for 23 years superintendent of Production for Lone Star Gas Company, terminated his service with the company on May 1, according to announcement by E. F. Schmidt, vice-president and operating manager.

Mr. Sutherland entered the gas and oil industry in 1889 in Butler County, Pennsylvania, and during his service in the contracting field drilled some 500 miles of wells. He joined Lone Star in March, 1918 from his position with the United States Fuel Company of Charleston, West Virginia.

In announcing his resignation, Mr. Schmidt stated, "I am sure we will miss the association we have had with Mr. Sutherland over these many years and all agree that he is entitled to rest and recreation as a reward for faithful service. Our best wishes go with him."

Mr. Schmidt said all matters pertaining to the drilling of wells for Lone Star Gas Company and Lone Star Gasoline Company will be under the direct supervision of L. T. Potter, chief production engineer for the company. Mr. Potter will have full charge of this work along with his other duties.

Northwest Conference Pacific Coast Gas Association

This Association's Annual Northwest Conference being held in Portland, June 9 and 10, will include both round-table discussions on vital sales procedures and talks by nationally known authorities. Speakers will include W. E. Derwent, Vice-President of the Geo. D. Roper Corporation, Geo. S. Jones, Vice-President of Servel Inc., and John Bogan, Sales Promotion Manager for C.P. gas ranges.

Southern Calif. Gas Company Announces Recent Promotions

Guy W. Wadsworth, Jr., was elected Vice-President in charge of employee relations of Southern California Gas Company at a meeting of the Board of Directors held April 16. Mr. Wadsworth and E. N. Simmons, Controller, were elected to the Board of Directors at the annual Stockholders meeting on the same date, filling two vacancies on the Board.

Guy W. Wadsworth, Jr.

Mr. Wadsworth, Personnel Manager of both this company and Southern Counties Gas Company, has been identified with the gas industry in Southern California since 1921, when he was employed by Southern Counties Gas Company in the orifice meter department.

Mr. Simmons, controller of the company since 1937, entered the employ of the former Los Angeles Gas and Electric Corporation in 1909 in the Auditing Department. He became assistant auditor in 1922 and general auditor in 1925. He has been active in Accounting Sections of the American Gas Association and Pacific Coast Gas Association, and is a member of the Management Committee of the Accounting Section of the A.G.A., and past chairman of the Accounting Section of P.C.G.A.

Effective May 1, W. R. Davis became Personnel Manager of the company, taking the title relinquished by Mr. Wadsworth, upon his election as Vice-President.

Mr. Davis entered the service of the company in May, 1937, in the capacity of Personnel Representative, and in 1938 was made Assistant Personnel Manager.

Fall River Gas Salesmen Write Insurance Policies—Sell 340 Gas Ranges in March

Perhaps it isn't exactly an insurance policy, but the folks at the Fall River Gas Works Company in Fall River, Mass. are working under the theory that placing a new gas range in a customer's home insures that customer against the wiles of competition for at least ten years, and to that end set out in March to sell 180 gas ranges.

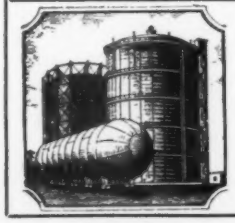
With about 25,000 customers and 10 district salesmen, this seemed like a pretty good job along with the other merchandising activities scheduled for that month. Special emphasis was placed on tying in with the national CP program and as a result 43 Certified Performance ranges were sold during the month with two of the Fall River salesmen winning second and sixth awards in the national contest. When the campaign ended on March 31 a total of 340 ranges had been sold, but this was not the whole story because a two-weeks grace period is given the salesmen and customers in which to finish up the activity during April. In spite of the fact that the salesmen began work on two new campaigns on April 1, they were able to sell in addition 145 ranges during the first 12 days bringing the total to 485 ranges about 2% of the domestic meters. Interesting too, is the fact that about 50 of these ranges were sold to customers who had been using competitive fuels.

Hirsh Becomes Laclede General Superintendent

Alfred Hirsh has been appointed general superintendent of The Laclede Gas Light Company in recognition of long and faithful service and proven ability in every previous position.

For the past 2½ years, Mr. Hirsh has served as assistant to President Childress. Prior to that, he was assistant secretary and treasurer for a number of years.

Mr. Hirsh started with Laclede in 1908, at the age of fifteen. Three years later, when only eighteen, he was made secretary to the comptroller.



STACEY BROTHERS

Gas Construction Co., Inc.

"STACEY-KLONNE" & TELESCOPIC GAS HOLDERS "STACEY BULLET" PRESSURE HOLDERS
PURIFIERS AND STEEL PLATE CONSTRUCTION

Executive Offices: Cincinnati, Ohio

Eastern Office: 21 West St., N. Y. C.

Woman's Service Center to Open This Fall

A national Center for Women, which will offer services and guidance on virtually every phase of the home and open new frontiers in homemaking for the women of America, has just been organized and will be known as the Woman's Service Center.

Jane Tiffany Wagner

Details of the new organization, which will have as one of its major activities a complete home economics consultant service for manufacturers to fill the long-felt need for a closer tie-in between consumer and manufacturer, were explained at a luncheon held at the Waldorf - Astoria Hotel in New York, May 6th.

The Center, which will have its headquarters in Chicago, opening in the early Fall, will include a broadcasting studio, consulting offices, laboratories for product testing, food research laboratory, clothing, food, and art units, as well as "The Home of New Ideas" containing the latest developments in all phases of homemaking. Also, a daily half-hour homemakers' radio program, over Station WENR (Chicago) of the National Broadcasting Co., bringing to feminine air audiences authoritative information on widely varied problems of the home. The Director of the Center is Jane Tiffany Wagner, nationally known home economist and former director of the home economics department of Servel, Inc.

In effect, the Woman's Service Center will be an educational center where women of the nation may learn how to make the most of their homes and how to make the most of themselves. Recognizing the home as the focal center of national life, the objective will be to interpret to women the true functions of a home; how to create and maintain it in accord with ever-advancing standards of living. Thus, every phase and problem of homemaking and home living, from budgets to bathroom accessories, will be considered. While a good deal of emphasis will be placed on that service of the Center which will seek to keep women informed on latest trends and techniques in homemaking, individual attention will be given to outside, cultural activities related to women's interests, such as beauty, art and music. To the Center, women may come and consult with experts on everything from how to plan their kitchens, to what college to send their son; what type of equipment will improve their homes; and what type of cultural activity will improve their minds.

The growing realization of the need for a more intelligent cooperation and understanding between consumer and manufacturer was largely instrumental in bringing about formation of the Woman's Service Center. Consequently, the Center will keynote its activities to meet this need. There will be three floors of exhibit space for manufacturers in the Center, where their products may be set up in home surroundings and where first-hand consumer reaction may be obtained. Expert advisors of the Center staff will then interpret this consumer reaction to the manufacturers, supplementing it with their suggestions for improvement or revision of the product. Products will be tested in the research laboratory of the Center, and research conducted as to their usability. Actual product designing and creation of new accessories will be done here, as part of the service for manufacturers.

In order to effect the fullest degree of cooperation with manufacturers, a New York office will act as contact point for the Eastern Division of the Center.

Plan of action for the Center will be as follows: Large groups of women, such as Garden Clubs, Women's Clubs, church groups, etc., will be invited each day to visit the Center and listen-in on the radio broadcast. Following a tour of the Center, they may make an appointment, or call back at any time for an interview on any particular home problem they may have.

Activities of the Center will be divided into seven units, Kitchen Planning and Home Equipment; Home Planning; Fashions and Clothing; Food and Nutrition; Cultural Advancement; Demonstration Units; Radio.

On the top floor of the Center will be a Laundry Clinic; a model Basement and Recreation Room; a Child's Play and Equipment Room; and a Theatre, where sales meetings can be held during conventions in the Chicago area.

The Consulting Service for manufacturers will, in addition to the activities already outlined, furnish manufacturers with detailed reports and recommendations on their products; plan organizational functions; plan and prepare literature supplying the woman's viewpoint; and, in general, present sales angles and sales approaches for women.

Servel Inc. Appoints Martha Jane Tupper

Martha Jane Tupper, well known home economist, formerly associated with the Brooklyn Union Gas Co., of New York, has been appointed Director of the Home Economics Department of Servel, Inc., Evansville, Ind., it has been announced by George S. Jones, Jr., vice-president and general sales manager of the company.

Martha Jane Tupper

Mrs. Tupper brings to Servel a well rounded experience in the home economics field. Of particular value in her work will be the experience in the home economics activities of gas utility companies secured during her association with the Brooklyn Union Gas Co. She has held important teaching posts at New York University and at the Tennessee State Teachers College. She was also formerly associated with a national woman's magazine.

While at New York University in New York City, she conducted demonstrations and cookery classes in the University's home economics division and also was consultant to national and international food accounts.

Vandagriff Appointed Laclede Sales Manager

R. J. Vandagriff was appointed sales manager of Laclede Gas Light Co. on April 1, succeeding W. A. Hudson. He had held the position of assistant sales manager for the County Gas Company for the past nine years.

Mr. Vandagriff began his utility career with the Des Moines Gas & Electric Company in 1927.

The Reliable Shut-Off for Street Mains

THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

Ask for circulars on this and other distribution equipment.

Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

New Standards Available On Water Heaters and Commercial Appliances

At the forty-seventh meeting of the American Gas Association Approval Requirements Committee held on March 21, 1941, recommended revisions to American Standard Approval Requirements for Gas Water Heaters and Listing Requirements for Attachable Water Heating Units were reviewed and approved with minor revisions. A tentative set of standards covering gas counter appliances was also considered and likewise approved. All become effective January 1, 1942. Mimeographed copies have been prepared and distributed to interested manufacturers so that ample time will be given for anticipation of their provisions in new production. They are also being submitted to the American Standards Association for acceptance as American Standard.

Strengthening of performance tests for automatic pilots forms one of the principal revisions to current requirements for gas water heaters and attachable water heating units. Tests have been added to assure satisfactory continued performance of such devices for the life of the complete unit. Provision has also been made for assuring rated hydrostatic test pressures for storage vessels of assembled water heaters. These must withstand a hydrostatic test pressure of 300 pounds per square inch, or their rated pressure if greater than this amount, without developing leakage or permanent deformation.

New standards covering gas counter appliances were developed as a result of considerable study and investigation of contemporary equipment. They apply to gas coffee brewers and urns, food and dish warmers, gas waffle bakers, gas-fired hot water immersion sterilizers, and commercial hot plates and griddles. They cover not only city gases, but liquefied petroleum gases and butane-air gas as well. In addition to thoroughly providing for all necessary constructional features, performance tests designed to simulate actual conditions under which they operate in practice have been included. For this reason, while constructional features for all gas counter appliances are included in a common section, performance tests for each type are grouped separately. Adequate provisions have also been incorporated to govern all kinds of accessories normally utilized with such equipment. Compliance with these details was felt necessary to assure satisfactory operation under all conditions of usage.

Although these three sets of requirements do not become effective until January 1, 1942, any manufacturers electing to do so may submit their equipment for test for compliance with them in advance of that date. In that case, Certificates of Approval or Listing granted thereon will be dated as of January 1, 1942, rather than of the time of test, as is customary. Further information may be obtained by addressing the American Gas Association Testing Laboratories in Cleveland, Ohio, or Los Angeles, California.

Dieterle Elected President of Chicago Chemists Club

At the annual meeting of the Chicago Chemists Club, held May 7 at the Stevens Hotel, Edward A. Dieterle, Consulting Gas and Chemical Engineer, with offices

Edward A. Dieterle

at 122 South Michigan Avenue, was elected President of the Club for the ensuing year.

Upon graduating from the University of Illinois, Mr. Dieterle started work as Assistant Chemist for the Peoples Gas Light & Coke Company and later became Assistant Superintendent of one of their manufacturing plants. Among other positions held by Mr. Dieterle prior to his entrance into the consulting field were those of Chief Chemist, Seattle Gas Company; Assistant Chief Chemist of the Koppers Company with laboratories at Mellon Institute, Pittsburgh, and Chief Chemist of the Chicago By-Product Coke Company, Chicago. He had an appointment as consulting Gas Engineer with the United States Bureau of Standards, Washington, D. C., during the last World War.

Mr. Dieterle has been active in a number of technical organizations and has served as Chairman of the Puget Sound Section of the American Chemical Society and Chairman of the Gas Engineering Section of the Western Society of Engineers. He has also served as President of the Illini Club of Chicago.

CP Ranger Club Awards

Checks of $10 and $25, totaling more than $700 have been awarded to fifty-seven utility and dealer salesmen who sold 25 or more CP gas ranges up to April 1st and qualified for membership in the 1941 Ranger Club. The CP Ranger Club is sponsored by the American Gas Association and all cash prizes are donated by the CP gas range manufacturers. See March issue of the JOURNAL for details, prizes and other awards.

REED'S 4 WHEEL
Razor Blade Pipe Cutters

IDEAL FOR ANY TRENCH OR OTHER CLOSE QUARTER JOBS

4.67
F. O. B. ERIE

Capacity
½" to 2"
Weight 5 lbs.

The REED FOUR WHEEL Cutter operates with a short back and forth motion through only one-third of a circle. Each of the four wheels exerts the same pressure on the pipe, and all 4 therefore cut evenly and completely through the pipe at the same time.

Equipped with Reed special alloy RAZOR BLADE Wheels, which cut with remarkable ease, leave little burr, and have a long life of useful service.

A sample cutter for test and trial may be ordered on memorandum invoice, to be paid for if retained or returned for credit if unsatisfactory. Try it once, and you will use no other.

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Franklin Institute to Honor Raymond Mower Conner

For more than a century, The Franklin Institute in Philadelphia has been singling out workers in science and industry whose contributions to public welfare merit special commendation. At the annual award of medals and certificates this year, the Walton Clark Medal will be awarded to Raymond Mower Conner, director of the Gas Appliance Testing Laboratory of the American Gas Association.

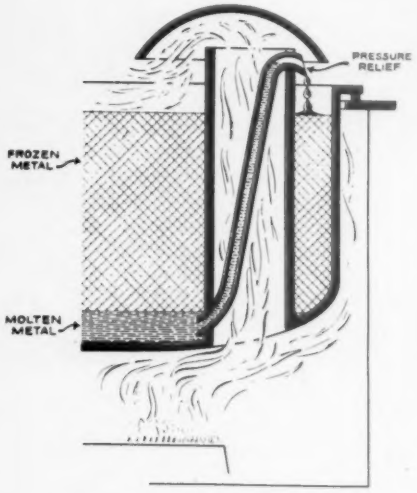
This medal is awarded to the author of the most notable advance in knowledge or improvement in apparatus; in method concerning the science and art of gas manufacture and its distribution or utilization in the production of heat, illumination, or power.

Mr. Conner has been director of the Gas Appliance Testing Laboratory since its foundation in 1925 and under his direction much notable work has been accomplished. Three primary points of view have been kept in mind in this work. They cover minimum requirements for satisfactory performance, substantial and durable construction, and safe operation. Some idea of the amount of work which must be undertaken may be gained from the fact that approval of a domestic range required 250 separate tests.

Pressure-Relief Device for Soft Metal Furnaces

A device which appears to have solved a problem which long has troubled the designers and users of soft metal melting furnaces recently was patented by Henry Hartmann, an industrial sales engineer for The Brooklyn Union Gas Company.

The device consists of a tube which runs from a point near the bottom of the metal pot, up through the hot flue gas passage, to a point just above the surface of the metal being melted. This tube serves to relieve the tremendous pressure which is generated in the bottom of the pot when heat is applied to a pot filled with "frozen" metal.



The tube acts much the same as that in a coffee percolator. It permits the molten metal under pressure to flow to the surface, thereby relieving the pressure. On the basis of extensive tests under widely varying conditions, it is believed that the device will prevent "blowoffs," cracked pots and (in the case of bottom draw-off furnaces) leaky valves.

The patent has been assigned to the United American Metals Corp. and a number of remelt furnaces in which the pressure-relief device is embodied already are in operation in some of the country's most important newspaper plants.

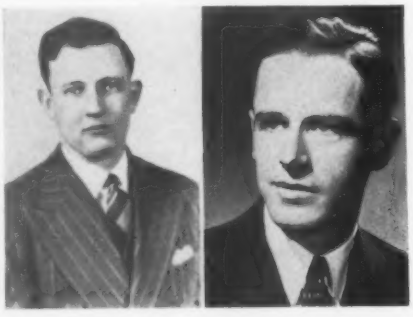
Development of the device is typical of the service which the Brooklyn utility seeks to give its customers. Since approximately 90% of all medium-sized soft metal melting furnaces are gas-fired, any improvement in the design of such equipment indirectly benefits the gas industry.

It is believed that the invention will have applications to other fields, notably in the furnaces used for heating salts in metal treating operations, for melting tin, lead and zinc, and for heating pitch and asphalt.

Robertshaw Expands Sales Organization

Additions to the Robertshaw Thermostat Company's Sales-engineering staff were recently announced by Mr. T. T. Arden, Sales Manager.

Following an intensive training course in the various departments of the Robertshaw Research Laboratory at Pittsburgh, the Engineering and Manufacturing Division at Youngwood, and at the St. Louis plant of the American Thermometer Company the following were appointed to represent the Robertshaw Group (Robertshaw Thermostat Company, Grayson Heat Control, Ltd., and the American Thermometer Company).



W. D. Mastin J. B. Selover

W. D. Mastin, Manager Southern Division, graduated from Alabama Polytechnic Institute with a degree in Mechanical Engineering. Shortly after graduation he became associated with the Atlanta Gas Light Company as a salesman in the Domestic and House Heating Department. From here he was transferred to the Testing Laboratory under the supervision of Mr. Carl R. Lawrence. Following this he served in the Industrial Sales Department as Industrial Engineer. Mr. Mastin maintains his headquarters at 2406 East Fourth St., Chattanooga, Tenn.

John B. Selover, Sales Engineer, Chicago, Ill., graduated from Ohio University in 1935 with a degree in electrical engineering and was employed by the American Gas Association Testing Laboratories as test engineer. With two years experience in the laboratories, particularly in the central heating division he accepted the position of Chief Engineer with the Automatic Gas Equipment Company of Pittsburgh, Pa. During his three years at Pittsburgh Mr. Selover designed several new lines of gas fired heating equipment.

On January 1, 1941, Mr. Selover became associated with the Robertshaw Group. His assignment as Sales Engineer in the Chicago office at 310 South Michigan Blvd., serving the Middle Western accounts soon followed.

Survey on Gas Appliance Sales

A survey of gas appliance sales in 13 major cities in the United States during the years 1937-1940 has been released by the statistical department of the Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd Street, New York.

The survey was prepared at the suggestion of the Association's Advisory Committee on Statistics with the thought that the information may prove particularly valuable to manufacturers of gas appliances and will aid them in better directing sales promotion efforts, advertising expenditures, etc. The total meters served by the gas companies reporting represent approximately 25 per cent of all the customers now served throughout the country.

Koppers Consolidates Chicago Offices

The Chicago offices of The Koppers Coal Company and the Bartlett Hayward and Wood Preserving divisions of Koppers Company have consolidated, it is announced by Walter Rothenhoefer, general manager of sales for the coal company. The new offices are located in the Railway Exchange Building, 224 South Michigan Avenue.

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Midwest Industrial Gas Sales Meeting

Upwards of seventy industrial gas engineers attended the spring meeting of the Midwest Industrial Gas Sales Council meeting, held at Rock Island, Ill., May 8th and 9th.

George A. Uhlmeyer, Industrial Gas Engineer of the Peoples Power Company and host, opened the meeting with greetings of welcome to his territory. George L. Ballard, chairman of Midwest, then introduced James J. Offutt, Ceramic Engineer, who proceeded with the paper, "Selecting Refractories for Gas-Fired Industrial Furnaces." This talk was supplemented by a moving picture in technicolor entitled "Behind the Firing Line." This movie showed the complete cycle in the manufacturing of the various type refractories with all its ramifications from the digging of the natural clays to the finished product.

The second phase of the program concerned a paper, "Furnace Design and Utilization," presented by R. J. Cowan, Surface Combustion Corp., Toledo, Ohio. His talk dovetailed into the previous one in the matter of refractories used.

The afternoon meeting began with a minutely detailed dissertation on the "Development of Straight Line Curves for Straight Forward Solution of Industrial Gas Burning Problems," by Slade B. Gamble, National Machine Works, Chicago, Illinois. Various chart enlargements in full view together with actual burner equipment were on display.

The next talk was delivered by Gordon Williams, Metallurgist, John Deere & Company. Mr. Williams informed the group as to "What the Gas Engineer Should Know About."

R. B. MacDonald, President and General Manager, Peoples Power Co., Rock Island, in welcoming the Council to Rock Island stressed the importance of the utility engineer as a cog in the wheel of industry and expressed pleasure in acting as the host in the progress of this endeavor.

SPEAKERS AT THE BANQUET

Standing: (left to right) George L. Ballard, Chairman, Midwest Industrial Gas Sales Council, Springfield, Ill.; R. B. MacDonald, President and General Manager, Peoples Power Company, Rock Island, Ill.; Hyman Bornstein, Chief Metallurgist, John Deere & Co., Moline, Illinois; James Allen of Chicago, Ass't. Manager of Engineering and Construction Dept's., International Harvester Company.

Seated: (left to right) George A. Uhlmeyer, Industrial Engineer, Peoples Power Company, Rock Island, Ill., Toastmaster; Leonard J. Applequist, Past State Commander of the American Legion for the Department of Illinois; Brigadier General Norman F. Ramsey, Commandant of Rock Island Arsenal, Rock Island, Ill.

Obituary

FRANK L. CHASE

Frank L. Chase, 76, retired vice-president of the Lone Star Gas Company and veteran leader in the natural gas industry, died April 1.

Mr. Chase had been an official of the Lone Star Gas Company for 22 years before his retirement in 1939. He had since maintained offices in the Dallas Gas building and was, up to the time of his death, still active in company affairs in an advisory capacity.

His first job in the gas industry was as an executive in charge of eight companies which served the Ohio towns of Dayton, Springfield, and Miami Valley. He supervised both pipe line and distribution company activities in this position.

Frank L. Chase

Under his supervision the Gas Measurement Department of Lone Star was organized and developed into one of the most accurate organizations of its kind in the country. As operating manager, he had direct supervision of production, pipe lines, compressor stations, gasoline plants and telephone system in Lone Star's far-flung territory.

Mr. Chase was a leader in the industry as a whole, having served as director of the former Natural Gas Association of America, as chairman of the natural gas section of the American Gas Association, and as a member of the management committee of the latter organization.

He was one of the leaders in the movement to bring natural gas to outlying Texas towns, breaking established precedence by helping to form the Community Natural Gas Company for the purpose of serving small communities in north central Texas with gas from Lone Star lines. Under his leadership as president of the Community Natural Gas Company, the new distribution company grew from several hundred meters in less than 50 towns in 1925 when it was organized, to the present organization which serves some 300 towns in Texas and Southern Oklahoma.

Mr. Chase was outstanding in the work of bringing enforcement of the law to prevent gasoline stripping plant wastage of natural gas in Texas which was a major development toward the conservation of this natural resource.

ISAAC T. HADDOCK

Isaac T. Haddock, formerly vice-president of the New England Gas and Electric Association and for many years connected with the Cambridge (Mass.) Gas Light Company, was accidentally drowned on May 2nd.

Mr. Haddock, an enthusiastic yachtsman, had gone out alone in his boat. Apparently, the tender which he was towing broke loose and in attempting to recover it he fell overboard and was lost.

Mr. Haddock was born at Tiverton, R. I., on August 14, 1882. He attended the public schools at Tiverton and the Durfee High School at Fall River. In 1903 he graduated from the Massachusetts Institute of Technology.

I. T. Haddock

Photo Blank & Stoller

Mr. Haddock spent about a year in Cuba as a chemist and soil analyst, and in 1904 entered the employ of the Cambridge Gas Light Company, with which company he was actively identified up to the time of his retirement. In 1919, he also became general superintendent and in 1931, vice-president of the New England Gas & Electric Association.

Even after his retirement from active service in 1938 he still continued as vice-president and director of the Cambridge Gas Light Company and the Worcester Gas Light Company. In addition, he was director of the following companies: Cape & Vineyard Electric Company, New Bedford Gas & Edison Light Company, Cambridge Electric Light Company, Plymouth County Electric Company, Dedham and Hyde Park Gas and Electric Company, Marlborough and Hudson Gas Company, Milford Gas Light Company, New Hampshire Gas and Electric Company, Plymouth Gas Light Company.

Mr. Haddock was a member of the Society of Gas Lighting; a member of the American Gas Association; a member and former president of the New England Gas Association; a member and former president of the Guild of Gas Managers of New England; a member of the Engineers Club and University Club of Boston.

JAMES W. BARBER

James W. Barber, oldest employee of the Ruud Manufacturing Company and perhaps in point of continuous service, the oldest gas water heater salesman in the industry, died in Pittsburgh, Pa., on April first, 1941.

Mr. Barber joined the sales staff of the Ruud Manufacturing Company in 1899 and for 41 years traveled the same territory—Western Pennsylvania and Eastern Ohio.

CHARLES B. JAHNKE

C. B. Jahnke

Charles Bernhardt Jahnke, president and general manager of The Cooper-Bessemer Corporation, died at Mercy Hospital in Mount Vernon, Ohio, on May 6th. A heart attack, suffered while he worked in the garden of his home on the previous Saturday afternoon, proved fatal to Mr. Jahnke, after hopes for his recovery had brightened.

In 1935 he became affiliated with The Cooper-Bessemer Corporation as its chief engineer. In 1937, he became a vice-president and general manager of the corporation and, on December 27, 1940, was elected to the office of president and general manager.

WALTER G. RICH

Walter G. Rich, for 29 years manager of Southern Counties Gas Company's Whittier (California) district, died on April 20, of complications resulting from an emergency appendectomy.

Rich, a native of Salem, Massachusetts, entered the service of Southern Counties Gas Company on April 12, 1912. His previous experience in the gas business included several years with the former Los Angeles Gas and Electric Company, and a 10 month period with the Mexican National Gas Company in Mexico City, where he installed the city's first gas plant which manufactured the first gas ever made in the Republic of Mexico.

George J. Brett Elected Controller of Niagara Hudson

George J. Brett, treasurer of Western Division Companies of the Niagara Hudson System and assistant controller of Niagara Hudson Power Corporation, was recently elected controller of Niagara Hudson Power Corporation as announced by Alfred H. Schoellkopf, president.

Mr. Brett began his utility career in the accounting department of The Niagara Falls Power Company in 1917. He later became chief accountant of that company and in 1930 was elected its assistant treasurer.

In 1932 he became treasurer of the Buffalo, Niagara and Eastern Power Corporation and also treasurer of its subsidiary companies, and a year later he became assistant controller of Niagara Hudson Power Corporation. On the formation of the Buffalo Niagara Electric Corporation, in 1937, he was elected its treasurer.

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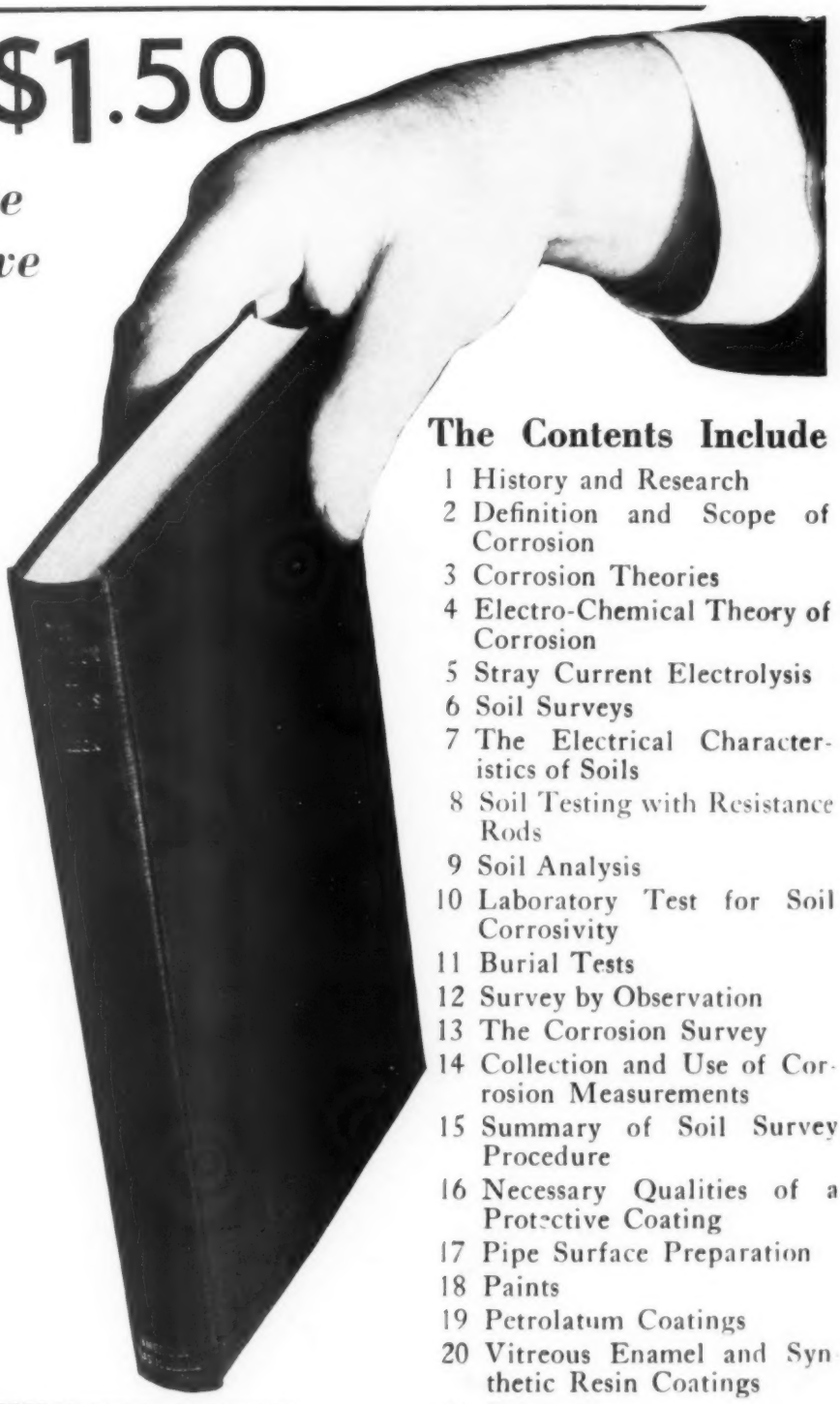

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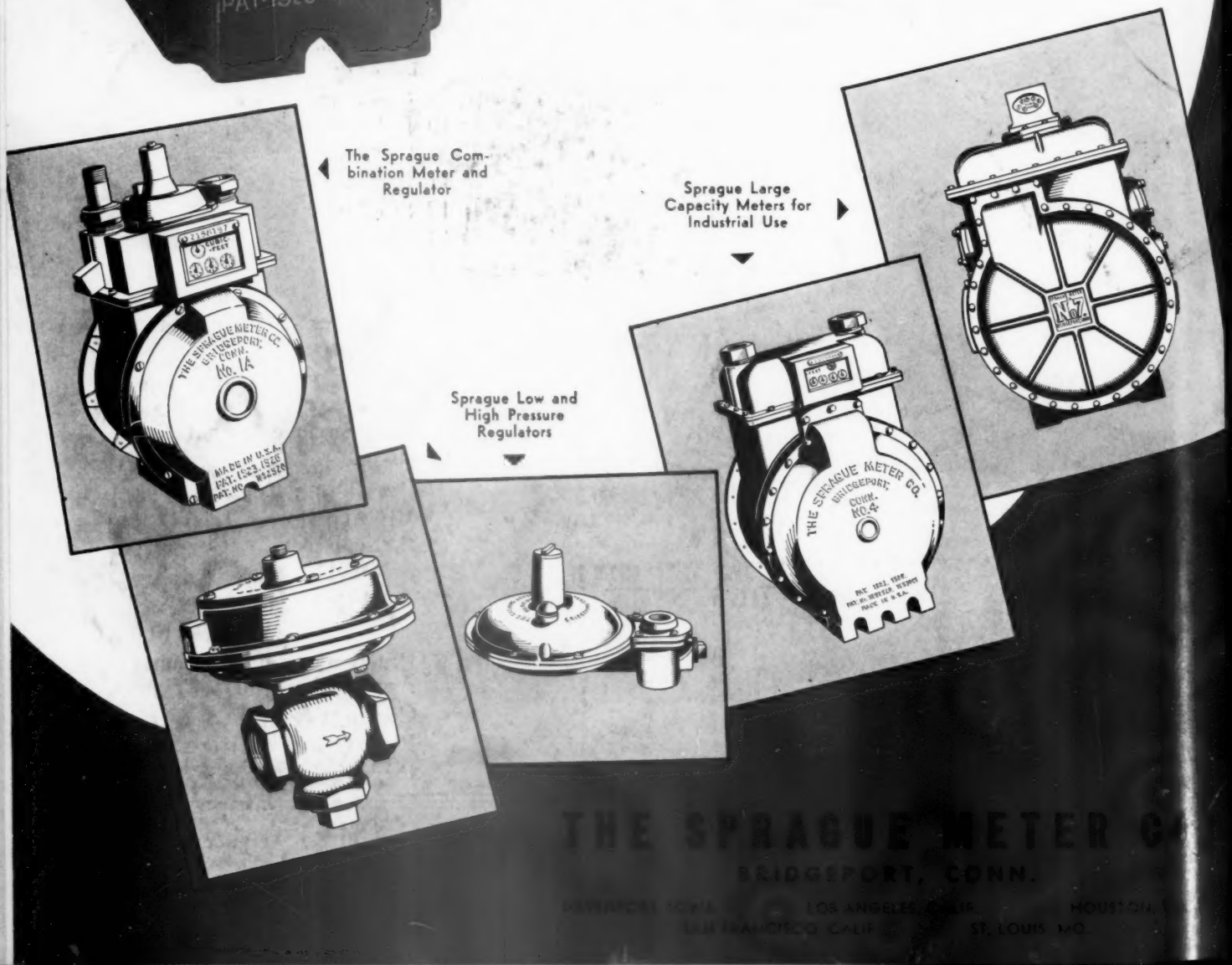

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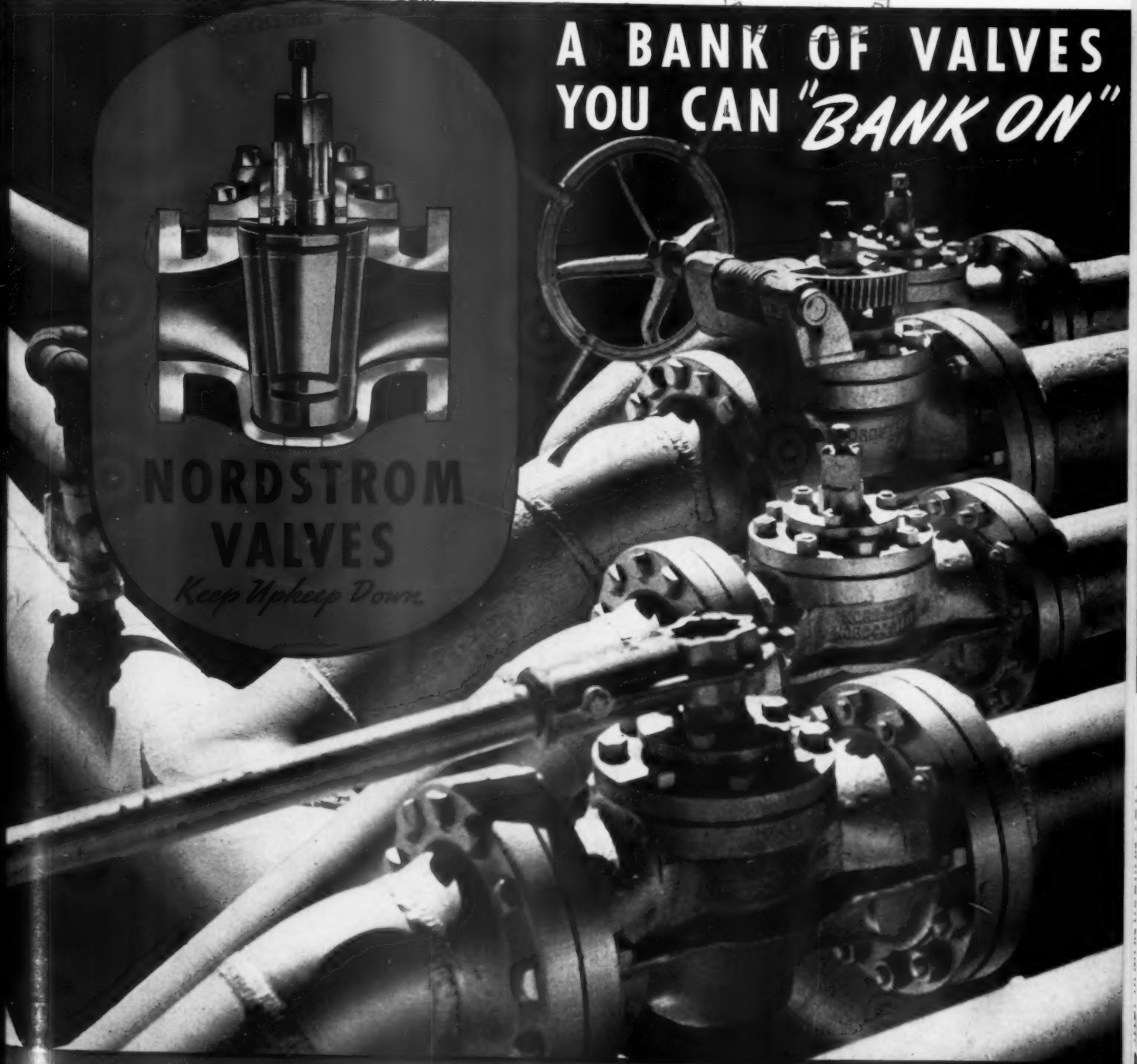

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